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ABSTRACT

Three concurrent validity studies were conducted on the relationship between performances on formative measures of spelling and performances on standardized spelling achievement measures using learning disabled (LD) and non-LD elementary students. Results of correlational analysis for four formative measures and three standardized measures provided support for the validity of Number of Correct Letter Sequences and Number of Correct Words on a dictated word list as indices of spelling achievement. Data from different grades (2 through 6) and placements (LD resource room vs regular placement) supported the hypothesized developmental trends in performance across grades and the hypothesized differences in performance between regular and LD program Ss. Additional analyses suggested that any word selection procedure may be used and that the dictated list may be presented for 1 to 3 minutes to obtain valid results. The implications for the development of a formative evaluation system that can continuously monitor spelling progress and evaluate interventions are discussed. (Author/CL)

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Research Report No. 21

RELATIONSHIPS AMONG SIMPLE MEASURES OF SPELLING AND PERFORMANCE ON STANDARDIZED ACHIEVEMENT TESTS

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I. Adequacy of Norm-Referenced Data for Prediction of Success

II. Computer Simulation Research on the Assessment/Decision-making/Intervention Process

III. Comparative Research on Children Labeled LD and Children Failing Academically but not Labeled LD

IV. Surveys on In-the-Field Assessment, Decision Making, and Intervention

V. Ethological Research on Placement Team Decision Making

VI. Bias Following Assessment

VII. Reliability and Validity of Formative Evaluation Procedures

VIII. Data-Utilization Systems in Instructional Programming

Additional information on these research areas may be obtained by writing to the Editor at the Institute.

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Abstract

Three concurrent validity studies were conducted on the relationship between performances on formative measures of spelling and performances on standardized spelling achievement measures. Results of correlational analysis for four formative measures and three standardized measures provided support for the validity of Number of Correct Letter Sequences and Number of Correct Words on a dictated word list as indices of spelling achievement. Data from different grades (2-6) and groups (LD resource program vs regular program) supported the hypothesized developmental trends in performance across grades and the hypothesized differences in performance between regular and LD program students. Additional analyses suggested that any word selection procedure may be used and that the dictated list may be presented for one to three minutes to obtain valid results. The implications of these results for the development of a formative evaluation system that teachers can use continuously to monitor growth in spelling and to evaluate interventions are discussed.

PART I

CONCURRENT VALIDITY OF FORMATIVE EVALUATION PROCEDURES: SPELLING

Introduction

The research reported here was conducted as part of a project that has as its purpose developing formative evaluation systems for teachers to use in improving learning disabilities service programs in spelling. The primary assumptions upon which that research project is based are:

(1) that the success of learning disabilities services is defined primarily by the extent to which those services improve the academic and social behavior goals of the individual students served,

(2) that teachers can increase the success of learning disabilities services by systematically measuring student progress toward achievement of program goals and then adjusting student programs to improve that progress, and

(3) that the technology presently available for teachers to use in measuring student progress and adjusting programs based on measured progress is either not sufficient or has not been sufficiently tested.

The particular part of the research project described here was conducted to answer a first and critical question that is raised when developing a formative evaluation system in spelling: what student performance data can be routinely and easily obtained that validly index achievement? The question arises because, for several good reasons, commerically prepared standardized tests of spelling ordinarily used

to assess achievement cannot be used routinely in a formative evaluation system to monitor performance. First, commercially produced standardized tests take too much time to administer. Second, an insufficient number of equivalent forms is available for any test to be used in the repeated measurement of performance required for formative evaluation. Third, the cost of using achievement tests repeatedly is prohibitive.

The development of measurement procedures that can be incorporated relatively easily into the daily routine of most teachers working in learning disabilities programs is deemed desirable if intensive monitoring of program effects on student performance is to occur. The importance of intensively monitoring program effects is that such monitoring enables us to more precisely determine the appropriateness of services provided to individual students. Given the requirement in P.L. 94-142 (Federal Register, 1977) that each handicapped student be provided an "appropriate educational program" and our current inability to diagnose and prescribe effective programs (Arter & Jenkins, 1978), continuous evaluation of a student's program is the only way to achieve substantive compliance with the law (Deno & Mirkin, 1980).

Beyond compliance with the law, research on the use of intensive repeated measurement in formative evaluation of instruction has already yielded evidence bearing on its potential benefits (Bohannon, 1975; Crutcher & Hofmeister, 1975; Frumess, 1973; Lovitt, Schaff, & Sayre, 1970; Mirkin & Deno, 1979). The research findings are isolated, however. The research and development program of which the present studies are a part was designed to systematically construct formative evaluation

procedures for learning disabilities programs that specify:

(1) What behaviors to measure when improved spelling proficiency is an IEP goal.

(2) How to repeatedly measure those behaviors reliably.

(3) Who should administer the measurement procedures.

(4) How often measurement should occur.

(5) How to obtain data most efficiently.

(6) How to use repeated measurements of student performance to increase intervention effectiveness.

The strategy employed in the present research was first to review available literature on spelling to identify behaviors that are commonly used to assess achievement in this academic domain; second, to develop measurement procedures for taking data on those behaviors; and third, to determine the reliability and validity of the measures by correlating the scores obtained with scores from standardized measures of spelling that are highly respected, and technically adequate with respect to their psychometric properties.

To be considered for inclusion in a formative evaluation system the developed measures had to fulfill the following criteria:

(1) They must be valid with respect to widely used measures of achievement in spelling.

(2) They must be immediately sensitive to the effects of relatively small adjustments made in a) instructional methods and materials, b) motivational techniques, and c) administrative arrangements (e.g., adjustments in grouping, setting for instruction, teacher/tutor, time of instruction, etc.).

(3) They must be easy to administer by teachers, parents, and students.

(4) They must include many parallel forms that are frequently administrable (daily if necessary) to the same student.

(5) They must be time efficient.

(6) They must be inexpensive to produce.

(7) They must be unobtrusive with respect to routine instruction.

(8) They must be simple to teach to teachers, parents, and children.

Our hope is that regardless of personal philosophical, theoretical, historical, and current situational constraints, those responsible for ensuring the quality of learning disabilities services will continuously evaluate the impact of those services on the academic and social behaviors of their individual students. The measurement procedures that are described here are an important first step in the development of such an evaluation system.

Review of the Literature

Spelling is often part of the language arts curriculum in the elementary schools. It is a necessary skill for effective written communication with others. However, most teachers teach spelling by presenting a list of words on Monday and testing the student's mastery of the list on Friday. This may be considered an evaluation system, but it is not necessarily a formative evaluation system. In many cases, it seems that the results of the weekly spelling test are simply recorded in the grade book and not considered in terms of monitoring individualized instructional plans.

The use of a formative evaluation system in spelling should involve collecting data to improve the process of instructional intervention. In other words, teachers should collect data continuously and use the data to determine whether the student's skills in spelling are improving, whether another instructional strategy should be employed, whether the materials need to be changed, and so on. By continually evaluating a student's progress, a teacher can diagnose spelling difficulties and enact changes in the system. Smith and Neisworth (1969) stated, "Competent and effective teaching demands constant evaluation of the curriculum, the individual characteristics of the children, and the impact of various instructional strategies. These data provide the necessary documentation of adjusting teaching techniques appropriately" (p. 5). These procedures are especially important for students in learning disabilities programs who often experience difficulty in the language arts curriculum.

Historically, spelling has been the subject of research since its introduction in the elementary school curriculum. This literature review is an attempt to focus on two areas of spelling research: general definitions of "spelling" and assessment of spelling ability. The section on assessment is divided into classroom methods, related research findings, and standardized measures.

Definition

Unlike other curriculum areas, spelling has been defined by many educators and researchers. Generally, it is defined as the correct sequencing of letters to form words for written communication. Hammill and Noone (1975) defined spelling as:

> the forming of words from letters in both written and oral forms, according to accepted usage. The written form is the most important to the child, as he [or she] is constantly expected to write about his [or her] ideas and feelings. The 'spelling bee,' the oral form, is primarily a technique employed to develop the skill of spelling and is actually used in the hope that the skill developed will transfer to the written form. (p. 89)

In a factor analysis study, Allen and Ager (1965) established the independence of spelling ability and the variables of spatial ability and verbal reasoning, which were previously believed to be critical to spelling ability. They felt that since spelling is an independent skill, it should receive specific instruction. Wallace and Larsen (1978) reported that "the ability to spell is one of the most basic and essential skills within the language arts curriculum" (p. 363). They further explained that spelling is the proper arrangement of letters into words that are necessary for effective written communication. The good speller understands the correspondence between phonemes (speech sounds of oral

language) and graphemes (letter symbols). The phoneme-grapheme relationships in English are somewhat inconsistent and may present difficulties for the beginning speller, considering that there are at least 251 ways of graphemically representing the 40+ English phonemes (Feigenbaum, 1958).

Greene and Petty (1963) reported in their Developing Language Skills in the Elementary Schools that "the ability to spell one word is distinct from the ability to spell other words" (p. 572). In an extensive study that began in 1962 at Stanford University, computer technology was utilized to study the relationships between phonemes and graphemes of 17,000 words (Hanna, Hanna, Hodges, & Rudorf, 1966). The results of the first phase of the study revealed English orthography to be a more consistent reflection of spoken language than had been assumed. The results showed the majority of consonants had single spellings that were used 80 percent or more of the time in the 17,000 words. In Phase II, the computer was provided four basic rules, based on the results of Phase I research, to determine whether the computer could successfully predict the spellings of the 17,000 words. The computer spelled 8,346 words (49.9%) without error, 37.2 percent with one error, 11.4 percent with two errors, and only 2.3 percent with three or more errors.

Otto, McMenemy, and Smith (1973) stated, "These latest findings argue strongly for the teaching of generalizations as the logical emphasis in a spelling program" (p. 253). Wallace and Larsen (1978) pointed out that teachers should assess students' spelling abilities and build their instructional methods based on these data. Words that students

are expected to spell fall into one of three categories (Wallace & Larsen, 1978, p. 368):

(1) words with regular phoneme-grapheme rules that are easily applied to many other words

(2) words that are homonyms that must be learned in context

(3) words that are highly irregular that must be learned primarily through memorization

Two studies (E. Horn, 1926; Rinsland, 1945) have served as the best sources of words used by children and adults in their writing. They indicated that 1,000 words account for 89 percent of all words used by children in their writing, 2,000 words account for 95 percent, and 3,000 words account for 97 percent of the total. They also reported that 4,000 words would identify 97 percent of all words used in writing by adults and children (1,000 only by children, 1,000 by adults, and 2,000 by both groups). Hodges and Rudorf (1966) stated that the elementary spelling program from Grade 2 through 8 encompasses approximately 3,000 words.

In summary, the literature suggests that spelling is the correct sequencing of letters for written and oral communication and that it is an independent skill. Although the English language seems inconsistent in comparison to other languages, the Stanford research demonstrated that the majority of words can be spelled correctly if a few phoneme-grapheme relationships are known. In light of the Stanford research and the relatively small size of spelling vocabularies, spelling skills should be assessed easily. The implication of research is that if a student can spell a certain word using phoneme-grapheme rules,

then this skill will likely transfer to other similar words. The teacher should not have to test every word in a student's vocabulary to determine the student's spelling abilities.

Assessment of Spelling Ability

Gertrude Hildreth (1955) outlined the three most commonly used tests of spelling ability as: (1) survey or standardized achievement tests, (2) inventory and diagnostic tests, and (3) informal classroom tests. E. Horn (1967) felt that there were several types of evaluation, including standardized tests, daily or weekly tests, and tests that measure progress for a term or year. Diagnostic spelling tests were not reviewed here because most of them are used for error analysis rather than for determining spelling achievement. Further, they are utilized infrequently and do not meet the criteria of formative measures (e.g., ease of administration). The reader is referred to Wallace and Larsen (1978) for further information on diagnostic spelling tests. The assessment devices reviewed here are standardized achievement tests (which served as the criteria for validity) and informal assessment devices (which were evaluated for use in a formative evaluation system).

Classroom or Informal Assessment

There are numerous ways to measure a student's spelling abilities in the classroom. Hildreth (1955, p. 290) listed ten ways to assess a student's skill level:

(1) dictation of words in a list

(2) dictation of words in context

(3) detection of spelling errors in written composition and

correcting the misspelled words

(4) recognition of errors printed in word lists

(5) proofreading for errors in context

(6) sentence completion device

(7) letter writing test

(8) copying test

(9) timed writing test

(10) tests in the use of the dictionary

Cartwright (1969) reviewed four spelling measures:

(1) dictated spelling test

(2) cloze procedure

(3) proofreading

(4) free writing

These latter four procedures are reviewed here because they are most commonly mentioned in the literature (Peters, 1967; Wallace & Larsen, 1978) and have the desired characteristics of formative measures. The reader is reminded that "we cannot, of course, measure directly the ability to spell; we can only observe and measure behavior and behavior change and from these observations infer ability to spell" (Rudorf, 1966, p. 53).

Dictated Word Lists. Dictation-type tests or tests of recall are used most often in schools. They are the most valid and are more difficult than recognition measures (Cartwright, 1969; E. Horn, 1941; Peters, 1967). Dictation tests can be either word lists or words in context. Researchers (Hawley & Gallup, 1922; E. Horn, 1944, 1954; McKee, 1927; Strickland, 1951; Winch, 1916) have shown that initially

presenting words in list form is a more successful method than presenting words in sentences or paragraph form. E. Horn (1941) summarized findings regarding dictated word lists as follows:

> Written tests are to be preferred to oral tests since they make possible the record of each pupil on each word and hence the results are more readily utilized for instructional purposes. Recall tests are superior to and more difficult than recognition tests. The evidence indicates that the most valid and economical test is the modified sentence recall form, in which the person giving the test pronounces each word, uses it in an oral sentence, and pronounces it again. The word is then written by the students. (p. 1179)

Cartwright (1969) felt the primary advantage of the dictated word test is that, aside from word selection, it takes very little advance preparation by the teacher, and all students can be tested simultaneously. Greene and Petty (1975) recommended a different time limit for each grade for dictation tests. The time limits recommended were based on the standard writing rates per letter for students in each grade, adjusted for the time required for dictation, in seconds per letter. The recommended time limits per letter were:

GRADE	2	3	4	5	6	7	8
	1.84	1.38	1.18	1.00	.92	.83	.73

For example, if a word contained eight letters, children in Grade 2 would need approximately 15 seconds to hear and write it while children in Grade 6 would need approximately 6 seconds.

The dictated word list meets many of the criteria specified earlier for a formative measure. However, this method has some disadvantages, including:

(1) unreliability in scoring due to illegible writing

(2) presence of clues to correct spelling in the examiner's

pronunciation

(3) known deterioration of the spelling ability of the scorer after long periods of scanning misspelled words

Proofreading or Multiple Choice Tests. Multiple choice, or recognition tests, can take many forms. Margaret Peters (1967) pointed out several possible test formats, including:

(1) incorrect words are underlined

(2) correct words are underlined

(3) given the beginning and end of the word, the student selects the correct middle letters to complete the word

(4) incorrect words in meaningful sentences are underlined

Regardless of the test format, the student is expected to proofread a selection or group of words and determine whether any spelling errors were committed. One advantage of the multiple choice spelling test is that it can cover four times as many words in approximately the same administration time as the dictated word list (Freyberg, 1970). Aside from selecting misspelled words, more information about the student's spelling skills may be obtained if the student is required to correct the misspelled word (Cartwright, 1979). Disadvantages of the multiple choice format are:

(1) the method lacks natural relevance because the student's performance is not an act of spelling proficiency per se, but depends on proofreading abilities such as visual acuity

(2) the student may learn the misspelled words and confound his/her progress in spelling

(3) the test does not yield the same difficulty coefficients for the same words when they are presented in misspelled and correctly spelled forms

A Comparison of Recall and Recognition Tests. Freyberg (1970) conducted a study on the concurrent validity of the dictated word list and multiple choice tests using spelling performance in written work as the criterion. The results showed that the dictated test had slightly higher concurrent validity with the criterion measure (.72) than the multiple-choice test (.68). In addition, the recall and recognition tests correlated quite highly (r = .85) with one another, which suggests they probably are measuring the same skill. Nisbet (1939) found that recognition tests measured much the same ability as recall tests. Also, in their factor analytic study, Allen and Ager (1965) found that various formats of spelling tests (including recall and recognition tests) did not vary in factorial composition and therefore, "they may be considered equivalent measures of spelling ability" (p. 156).

Cloze Method. Cartwright (1969) discussed the cloze procedure as assessing specific spelling difficulties that could be used to determine a student's knowledge of spelling rules. The technique requires the student to fill in a missing word in a sentence or supply missing letter(s) in a word. Examples include:

The dog buried the _____.

e - e p h - - t.

Although this method may be used to detect spelling ability, there are limitations to it, including: (1) students may choose not to complete the exercise, (2) reading ability is a factor, and (3) teacher time to create and correct the items can be lengthy.

Spelling within Written Expression. Freyberg (1970) and Rowell (1975) contend that the prime objective of teaching spelling is to im-

prove the student's spelling accuracy in everyday writing. Cartwright (1969) suggested that teachers keep a systematic record of a pupil's writing to determine whether there are certain spelling difficulties or growth over time. Because accurate spelling in daily work is the ultimate target behavior of a spelling program, assessing spelling within writing seems to be the best overall measure. However, there are numerous drawbacks to this measure when the desired characteristics of formative measures are considered. Disadvantages of this procedure are:

(1) may not be sensitive to instruction over short periods of time
(2) time inefficient
(3) difficult to score
(4) obtrusive
(5) difficult to teach method to teachers
(6) probably could not be administered frequently

This review suggested that a recall measure, the dictated word list, most clearly matches the criteria established for a measure of spelling to be used in a formative evaluation system.

Related Research Findings

Various researchers have addressed the problem of different approaches or methods used by teachers in spelling programs. Although the research findings are numerous, results relevant to one formative measure, the dictated word list, are presented here.

Words Presented in List vs. in Context. Allred (1977) stated that one of the most consistent research findings is that the list method is more efficient than the context method. Other researchers also

found that initial presentation of words in list form is more successful than words in sentences or paragraphs (Hawley & Gallup, 1922; E. Horn, 1944, 1954; McKee, 1927; Strickland, 1951).

Meaning of Spelling Words. It has been established that it is not necessary for children to learn the meaning of the majority of spelling words in order to learn to spell (E. Horn, 1960; T. Horn, 1969).

Test-Study-Test vs. Study-Test Method. Many researchers have studied the differences between these two methods of spelling instruction. Consistently, the test-study-test method is superior to the study-test method (Fitzsimmons & Loomer, 1977). This finding suggests that testing should be used for both formative and summative evaluations.

Individualized Instruction. Fitzgerald (1953) stated that "the spelling problems of one child differ from those of others because children vary in experiences, abilities, needs, difficulties, interests, attitudes, and development" (p. 85). Eisman (1962) and Hall (1962) pointed out the need for individualized approaches in spelling. Allred, Baird, and Read (1964) and Noall and Ceravalo (1964) found individual approaches as good or better than whole class methods. In light of these findings, the use of a formative evaluation system in spelling may aid individual students.

Daily Testing. An intervention study by Rieth, Axelrod, Anderson, Hathaway, Wood, and Fitzgerald (1974) compared a system of presenting all the week's spelling words at the beginning of the week with a procedure where the students received a portion of the words each day and were tested daily. Results indicated that "students did better on the weekly review tests when they received a portion of the words each day

and were tested daily, than when they received all words at the beginning of the week and did not have daily tests" (p. 73). They also found that receiving some words daily without testing was inferior to receiving the words with daily testing. E. Horn (1967) stated: "The evaluations which most helpfully influence learning are those used to guide the pupils' efforts from day to day" (p. 29).

Self-Correction of Tests. E. Horn (1960) contended, "The primary purpose of all tests and appraisals is to facilitate the development of spelling ability of individual students. But tests serve this purpose only when the results of the appraisals are used" (p. 1350). E. Horn also stated, "When corrected by the pupils and the results are properly utilized, the test is the most fruitful single learning activity (per unit of time) that has yet been devised. It helps pupils at all levels of spelling ability" (p. 17). Schoephoerster (1962) and Christine and Hollingsworth (1966) showed that the child correcting his/her own spelling test under the teacher's direction is the single most important factor in learning to spell. These studies suggest that the student's participation in a spelling formative evaluation procedure may be an integral component of such a system.

Standardized Achievement Tests in Spelling

Hildreth (1955) reported that the chief value of standardized tests was their use as screening devices to locate students with very low skills or as a check on the progress of a class. Westerman (1971) added: "Unfortunately, most of these instruments serve but one major function: to discover how many words a child can spell as compared to others in his [or her] class, thus providing a so-called grade level score"

(p. 35). In addition, E. Horn (1967) provided four cautions regarding the interpretation of standardized test results:

(1) they reflect only in part the effectiveness of what is done in the spelling class

(2) abilities measured may not be closely related to the specific goals set up to guide instruction

(3) they are not a measure of teacher competence

(4) pupils' scores are widely distributed

These limitations of standardized tests further support the need for better formative measures. However, standardized instruments do assess spelling skills and seem appropriate for establishing the validity of the formative measures.

Two major reports (Shores & Yee, 1973; Wallace & Larsen, 1978) review standardized achievement tests in spelling. Wallace and Larsen focused on the technical adequacy of various standardized tests and the skills assessed by them (i.e., dictated word versus proofreading). Shores and Yee reviewed the types of items used and standardization, especially construct validity. Based on these reviews and the information provided in Salvia and Ysseldyke (1978) on the technical adequacy of a large number of commonly used achievement tests, three tests seem most appropriate for establishing the concurrent validity of formative spelling measures. The three tests vary in scope and form, but all are technically adequate in terms of norms, reliability, and validity.

Test of Written Spelling. The Test of Written Spelling (TWS), developed by Larsen and Hammill (1976), is a dictated-word test that can be given to individual children or groups of children. (The format of the test and administration procedures are discussed

in the next section.) The TWS was standardized on 4,500 children. As Wallace and Larsen (1978) stated, "The reliability and validity of the TWS are amply demonstrated" (p. 376). According to the test's manual, the reliability coefficients (KR-21) ranged from .78 for first graders to .91 for sixth graders ($p < .01$). The concurrent validity was established by comparing the TWS to four measures containing spelling subtests. The results were:

Criterion Tests	Concurrent Validity for Total TWS
Dictation Tests:	
Durrell Analysis of Reading Difficulty	.90
Wide Range Achievement Test	.84
Multiple Choice Tests:	
California Achievement Test	.80
SRA Achievement Test	.69

Peabody Individual Achievement Test - Spelling Subtest. The Peabody Individual Achievement Test (PIAT) is an individually administered test. The spelling subtest is a proofreading task that requires the student to identify the correct spelling of a word from among four stimulus words that are variations of the same word. The PIAT was standardized on 2,899 students. The test-retest reliability coefficients ranged from .42 at Kindergarten to .78 at third grade. Approximately 50 to 75 children were tested at each of the six grade levels. The concurrent validity of the measure, based on the Wide Range Achievement Test, was $r = .85$ (Dunn & Markwardt, 1970).

Stanford Achievement Test - Spelling Subtest. According to Salvia and Ysseldyke (1978), "The Stanford Achievement Test is a model of what

adequately developed achievement tests should be. Its development, standardization, and technical characteristics are exemplary" (p. 152). Reliability data for the Stanford Achievement Test (SAT) consisted of split-half estimates and KR-20 coefficients. For the beginning of the fourth grade (Primary III), both the split-half reliability coefficient and the KR-20 coefficient were .94 for the spelling subtest. The SAT usually is administered as a group achievement test.

Three Studies of Spelling Measures

Three studies were conducted to develop appropriate formative measures of spelling and to test their concurrent validity using standardized measures of spelling. The methodology and results of each study are presented in this section. In each study intercorrelational matrices are presented for number of letters and words correct scored on the formative measures and number correct scored on the achievement tests. Other scoring procedures were also employed in the studies, but have been eliminated for practical consideration because they were time consuming for the scorer. These procedures are discussed in Part II of this report.

Study I

Method

Subjects. The subjects in this study were randomly selected from two Minneapolis public schools. Letters of consent, containing a description of the study, were mailed to the students' homes and returned to the schools. Forty-two students (21 students from each school) participated in the study. The students were in Grades 2 to 6, and ranged in age from seven to 13 years. The numbers of boys and girls were equal. Fifteen students were identified by their schools as learning disabled, and 27 were attending regular classes.

Materials. The materials included one standardized test and two formative measures. The standardized test was the Test of Written Spelling (Larsen & Hammill, 1976). This test is a dictated spelling list of 35 predictable and 25 unpredictable words. One of the formative measures was

a dictated spelling list comprised of randomly selected words from Basic Elementary Reading Vocabularies (Harris & Jacobson, 1972). This list contained words commonly found in preprimer to sixth grade basal reading series. Three different lists of words were generated. A measure of spelling was also obtained from a sample of written expression. For this measure, a picture stimulus was presented to help the students formulate a story line. Other materials included forms for the dictated spelling lists, forms for the written sample, pencils, stopwatches, and certificates for subjects participating in the study.

Procedure. The examiners administered the Test of Written Spelling, the dictated word lists, and had the subjects write a story about a picture stimulus. For the Test of Written Spelling, the examiner: (a) said the word in isolation, (b) utilized the word in a sentence, and (c) repeated the word in isolation. Subjects spelled the dictated words on a provided form. The test took approximately 20 minutes, although no time limit was set. For the formative measures the examiners dictated words for three minutes for each of the three word lists while the subject wrote his or her responses. The spelling lists were scored for number of correct and incorrect letters in sequence (see White & Haring, 1976, and Appendix A) and number of words spelled correctly and incorrectly. Finally, the examiner presented a picture stimulus, provided a verbal cue, and instructed the subjects to write a story. The time limit was five minutes. The examiner later scored the number of words spelled correctly. The subjects were tested on an individual basis. A randomly selected group of students was administered the Woodcock-Johnson Psycho-Educational Battery (Woodcock & Johnson, 1977) to obtain descriptive data.

Results

The number of correct letter sequences and words on three different preprimer to sixth grade level (PP-6) lists were correlated with the number of words spelled correctly on the Test of Written Spelling (TWS). The number of correct letter sequences and words were also intercorrelated with the other formative measure, and with the criterion measure of correctly spelled words on the TWS. The measure of spelling within a five-minute written sample was scored for number of correctly spelled words and percentage of words spelled correctly. These data are presented in Table 1.

Insert Table 1 about here

The data reveal high to very high correlations between number of correct letter sequences and words and the standardized achievement test. The spelling within a written sample produced only moderate correlations with spelling from dictated word lists and with the criterion test.

Tables 2 and 3 present intercorrelational analyses between the three PP-6 lists combined, spelling within a written sample, and the TWS for the regular students and learning disabled students. As shown in Table 2, there were very high correlations between correct letter sequences and words on the PP-6 word lists and the TWS for regular students. Moderate correlations resulted between number correct letters and words on dictated word lists and the written sample and between the TWS and the written sample.

Insert Table 2 about here

For the LD program sample, similar results were obtained. High correlations were obtained for number of correct letter sequences and words and the TWS. However, spelling within a written sample resulted in moderate correlations with the TWS and with the dictated word lists.

Insert Table 3 about here

Study II

Method

Subjects. The subjects were randomly selected from two Minneapolis public schools. Letters of informed consent were mailed to the students' homes and returned to the schools. Forty-five students (21 from one school and 24 from the other school) were included in the study. The students represented Grades 2 through 6, and ranged in age from seven to 12 years. Twenty-six of the subjects were male and 19 were female. Of the 45 students, 10 were identified by their schools as learning disabled and 35 were regular class students.

Materials. The materials included a standardized test and four word lists. The standardized test was the spelling section of the Peabody Individual Achievement Test (Dunn & Markwardt, 1970). The four word lists were generated through a random selection of words from the Harris-Jacobson (1972) word lists. The four lists were:

(1) words from preprimer to first grade level (PP-1)

(2) words from preprimer to third grade level (PP-3)

(3) words from preprimer to sixth grade level (PP-6)

(4) words from preprimer to sixth grade level sequenced by grade level (Ordered)

Other materials used were forms for the dictated spelling lists, pencils, stopwatches, and certificates for the participants.

Procedure. The examiner administered the spelling section of the Peabody Individual Achievement Test. The examiner read a word, used it in a sentence, and repeated the word. The subject was presented four choices, and she or he had to choose the correct spelling. Then the examiner dictated the words on the four spelling lists as the subject wrote the responses. Each list was presented for three minutes. The examiner recorded the subject's progress after one, two, or three minutes. Each word was read twice, and the examiner provided a sentence for words which could be spelled in more than one way. Each subject was tested individually. The spelling lists were scored in terms of number of letters in correct sequence, letters incorrect, and words spelled correctly and incorrectly. As in Study I, a small group of subjects was administered the Woodcock-Johnson Psycho-Educational Battery (Woodcock & Johnson, 1977) to gather descriptive data.

Results

In Table 4 are presented the intercorrelations for the combined groups. Very high correlations were found between the various lists. High correlations resulted for all the lists with the PIAT for both number of correct letters and number of correct words. The correlations were slightly lower for the Ordered list with the PIAT.

Insert Table 4 about here

The correlational results for the regular and LD program samples are presented in Tables 5 and 6, respectively. Very high correlations were observed among the four lists for regular students (see Table 5). Number of correctly spelled letter sequences and words on the various lists correlated highly with the PIAT, but again were slightly less for the Ordered list.

Insert Table 5 about here

The results for the LD program sample differed from the results for the regular sample. The lists did not intercorrelate as highly or as consistently (see Table 6) as in the regular and combined group samples. Also, the dictated word list measures, except in one case, correlated very low or non-significantly with the PIAT. The one exception was a very high intercorrelation between number of words spelled correctly on the PP-6 list and number correct on the PIAT spelling subtest.

Insert Table 6 about here

Study III

Method

Subjects. Subjects were randomly selected from two Minneapolis public schools and four parochial schools in the greater Minneapolis-St. Paul area. Letters of informed consent were mailed to students' homes and returned to the schools. The 61 students (35 males and 26 females) in the study were in Grades 2 to 6, and ranged in age from seven to 13 years. Twenty-nine students were identified by the schools as learning disabled and 32 were regular class students.

Materials. The materials for this study were a standardized test and four word lists. The standardized test was the spelling section of the Stanford Achievement Test, Primary III (Madden, Gardner, Rudman, Karlsen, & Merwin, 1973). The word lists were:

(1) words randomly selected from the Harris-Jacobson (1972) word list from the preprimer to first grade level (PP-1)

(2) words randomly selected from the Harris-Jacobson (1972) word list from the preprimer to third grade level (PP-3)

(3) words randomly selected from the Harris-Jacobson (1972) word list from the preprimer to the sixth grade level (PP-6)

(4) words selected from the cumulative word list in Inside Out (Clymer & Horrworth, 1976), Level 9 of the Ginn 720 reading series (Ginn 3)

Other materials included forms for the dictated spelling lists, forms for recording scores, pencils, stopwatches, and certificates for students participating in the study.

Procedure. The examiner administered the spelling section of the Stanford Achievement Test, Primary III. The subjects were given five minutes to complete the 47 items. Each item consisted of four words, three of which were spelled correctly, and one which was misspelled. The subject was required to find the misspelled word. Then the examiner dictated spelling words from the spelling lists. The subject wrote the words as the examiner recorded progress after one, two, and three minutes. The spelling lists were scored for number correct and incorrect letters in sequence, and number of words spelled correctly and incorrectly. Each subject was tested individually. Also, a random selection of students

was administered the Woodcock-Johnson Psycho-Educational Battery (Woodcock & Johnson, 1977) for descriptive data.

Results

The data from Study III were tabulated differently from those from Studies I and II. Number of correct letter sequences and total number of words spelled correctly were not intercorrelated for the various lists. The data presented in Table 7 show the numbers of correct letter sequences for the two groups of students and the combined sample on four lists: PP-1, PP-3, PP-6, and Ginn 3 (words chosen non-randomly from a third grade Ginn basal reader). As is evident in the table, high to very high correlations were found among the various lists and the criterion measure, the Stanford Achievement Test (SAT) spelling section, for all groups tested.

Insert Table 7 about here

Table 8 presents the data for the number of words spelled correctly. Again, the four lists intercorrelated highly and high correlations occurred between the various lists and the SAT.

Insert Table 8 about here

Discussion

Two formative measures, dictated word lists and spelling within a written sample, were considered as possible means of assessing spelling skill in a formative evaluation system. The purpose of the three studies was to establish through correlational analyses the concurrent validity of these measures with standardized tests of spelling.

The results indicated that dictated word lists correlated highly with several achievement tests: (a) the TWS, a dictated word test, (b) the PIAT spelling subtest, an individually administered proofreading test, and (c) the SAT spelling section, a group administered proofreading test.

The data also revealed that various lists intercorrelated highly among themselves and with the criterion measures. Further, as demonstrated in Study III, a word list comprised of nonrandomly selected words yielded results similar to those from randomly selected word lists.

The measure of spelling within written expression was eliminated from consideration as a formative measure in Studies II and III for several reasons. First, the measure resulted in only moderate correlations with the TWS. However, this finding might be expected since the behavior sampled on the TWS is the same as the dictated word list. A second reason was that the words that must be spelled by an individual writing discourse are controlled by that individual's vocabulary. This fact necessarily limits the value of the measure for students with small vocabularies. Although correct spelling in children's everyday writing is the goal of any spelling program, it is not necessary to use it as a direct measure. Not only are number of correct letter sequences and words in a dictated list valid formative measures, but they also are more practical for daily or frequent measurement. Spelling within a written sample requires more scorer time, more administration time, and may be influenced by factors such as pupils' lack of desire or inability to write a paragraph.

In general, the data for the regular and LD program samples were

comparable. The major inconsistencies were found in the second study, where there were many low and nonsignificant correlations among the lists and with the PIAT criterion measure. These data most likely occurred because only 10 learning disabled students comprised the sample. The dictated word lists proved to be valid for the other two LD samples, which were larger.

In summary, the results of the three studies suggest that the dictated word list is a valid measure of spelling skill when compared to three standardized spelling achievement tests. This finding is confirmed across grade levels, schools, and student samples. Further, the high intercorrelations found for various types of dictated lists (e.g., randomly selected or nonrandomly selected) indicate that the results are general rather than confined to a specific dictated word list. Generally, either number of correctly spelled words or number of correct letter sequences could be used as the scoring procedure, for students in both regular and learning disabled programs.

PART II

FORMATIVE MEASURES IN SPELLING: COMPARISON OF GRADE LEVELS AND STUDENT SAMPLES

Introduction

Spelling ability is expected to increase across grade levels - to demonstrate developmental trends. Such expectations are supported by the work of J. Cayce Morrison (1922), who examined the scores of 57,569 New York students on a spelling measure and found a steady increase in spelling ability across grade levels. In Part I of this report, it was demonstrated that the dictated word list formative measures were valid when compared to three standardized measures of spelling achievement. When the measures were developed, it was hypothesized that they also would discriminate between different grade levels and between different groups of students. If this hypothesis is accurate, the likelihood is increased that the formative measures can be considered as viable measures of spelling.

The purpose of this section is to examine differences in the performances of (a) students at various grade levels, and (b) regular and learning disabled students, on the formative spelling measures. Questions addressed here include: Are there differences in spelling ability within and across grade levels? Are there differences between regular and LD students in ability to spell? If there are differences between regular and LD students, are they consistent across grade levels?

To answer these questions, the data from the three studies presented in Part I were examined. Comparisons were made first for Study I results, then for Studies II and III combined. Study I data were separated because only one type of word list (Preprimer to Grade 6) was used in that study. Both Studies II and III employed four different types of dictated word lists.

Study I

Using the data from Study I, *t* tests were computed between the LD and regular samples on the various formative measures and the standardized achievement test. These are presented in Table 9. As shown in Table 9, the obtained probabilities for eight of the nine comparisons were $p < .001$. The obtained p value for the number of words correct in a written sample was $p < .02$. These findings suggest that the differences between the two groups of students are real differences and not the result of chance alone.

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Insert Table 9 about here

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Table 10 presents data on the mean number of letters correct, percentage of letters correct, and rate of letters correct per minute in the two groups at each of five grade levels. Differences in performance are evident both between groups and across grades, regardless of the method used to score the dictated word list.

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Insert Table 10 about here

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Studies II and III

Results for Studies II and III are presented in graphic form. Tables summarizing the number of letters and words correct are in Appendix B.

Mean Number of Letters Correct by Grade and Group

The first comparison of interest was the mean number of letters correct in sequence on the various lists. The data from Study II are shown in Figure 1. As shown in this figure, there was a steady increase in number of letter sequences correct across grade levels for both groups. Also, there was a distinct difference between the two groups; regular students attained more letter sequences correct than LD students. There were no third grade LD students in Study II.

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Insert Figure 1 about here

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The data on letter sequences correct from Study III are shown in Figure 2. Although the figure is similar to Figure 1, there was a decline in letter sequences correct from fifth to sixth grade in both groups, and from third to fourth grade among the LD students.

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Insert Figure 2 about here

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The three word lists used in both studies (PP-1, PP-3, and PP-6) were compared by combining the results of the studies. Figure 3 presents these results. As shown in the figure, there was an increase across grade levels. Further, there were differences between the two

groups, with LD students performing less well than regular students on the formative measure for correct letter sequences.

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Insert Figure 3 about here

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Mean Number of Words Correct by Grade and Group

Data on average number of words correct from Study II are presented in Figure 4. As before, there was an increase across grades. The regular students performed better than the LD students across grades.

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Insert Figure 4 about here

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Figure 5 shows the mean number of words correct data from Study III. The results are similar to those for letter sequences correct (see Figure 2). Again, there was a decrease in performance from fifth to sixth grades for both groups, and a decrease from third to fourth grade for the LD group.

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Insert Figure 5 about here

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Figure 6 presents the data from Studies II and III combined. In this figure, it is evident that there was a steady increase in number of words spelled correctly from second to fifth grade and a slight decrease between fifth and sixth grades among the regular students. A similar pattern occurred for the LD students, but there was also a decrease from third to fourth grades. Overall, at every grade level, the regular students had more correct spelling words than the LD students on every list.

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Insert Figure 6 about here

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Mean Number of Letters and Words Correct by Grade

The final three comparisons of interest were made by collapsing the two samples of student groups (regular and LD). Figure 7 shows the number of letter sequences and words spelled correctly for all students in Study II. The trends suggest little difference between second and third grades, a dramatic increase between third and fourth grades, another leveling between fourth and fifth grades, and an increase between fifth and sixth grades.

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Insert Figure 7 about here

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The Study III data (see Figure 8) indicate a slight increase between second and third grades, a plateau between third and fourth grades, a major increase between fourth and fifth grades, and a decrease between fifth and sixth grades for both correct letter sequences and total number of words spelled correctly.

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Insert Figure 8 about here

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Figure 9 represents the data from Studies II and III combined. The data in the figure suggest a steady increase across grade levels for letters in correct sequence and number of correct words on the various lists. Both trends leveled off between fifth and sixth grades.

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Insert Figure 9 about here

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Discussion

The comparisons reported in this section were undertaken to investigate the hypothesized developmental trends in performance across grades and the hypothesized differences in performance between regular and LD program students. The results of the comparisons confirmed that there were developmental differences in the students' ability to spell, and that these differences could be obtained by using the developed formative measure, the dictated word list. Also, there were differences between the number of letters in correct sequence and total number of correct words for the LD and regular students. These differences were highly consistent across grade levels.

According to the data presented in Tables A-F in Appendix B, the differences between LD and regular students' spelling skills are striking. The range for the LD students was 3.3 to 50.5 letters in correct sequence per minute, whereas the range for the regular students was 19.2 to 78.8. In addition, the number of words spelled correctly by LD students ranged from 0.3 to 8.8, while the range of scores for regular students was 2.0 to 15.4 words correct per minute. On the average, the regular students outperformed the LD students by a ratio of 4 to 1.

The results presented in Tables G-I (see Appendix B) also suggested changes in performance across grades when the groups were combined and lists collapsed. For example, for Studies II and III the results were:

Grade	Gain in Correct Letters	Gain in Correct Words
2-3	+6.36	+1.00
3-4	+5.37	+1.23
4-5	+10.93	+1.50
5-6	-1.43	- .30

The greatest growth was between fourth and fifth grades; a decrease in performance occurred between fifth and sixth grades. Spelling skills did increase with grade, but the growth in number of correct words was very small between any two consecutive grades.

In a number of the figures presented in the Results section, there were decreases between grade levels. However, the overall trend was an increase in number of letters and words correct. Two possible explanations for these performance curves are (a) the small number of LD students tested, and (b) the unequal number of students at each grade level. Future research should employ approximately equal numbers of students at every grade level. The present results suggest that a more continuous curve might be obtained by controlling the sample size.

The results of the comparisons have implications for the ways in which data from a dictated word list may be utilized in a formative evaluation system in spelling. For example, there seemed to be a greater range in the number of correct letter sequences between grade levels than in the number of correct words. This implies that teachers should graph letter sequence growth to show students their increases in spelling skills because increases will be more evident in these data. The presented results were based on one-minute presentations. Teachers could test for two or three minutes to obtain additional data for charting purposes.

The graphs presented in the Results section showed performances on different word lists. These pictorial representations indicated that the lists produced similar results across grades, and for both regular and LD groups.

In summary, the further analyses reported in this section suggest that the developed formative measure - the dictated word list - is an effective tool for obtaining expected developmental differences in students' spelling. This is true whether the scoring procedure involves correct letter sequences or correct words. The expected differences between regular and LD students are evident across all grade levels when the formative measure is used, with the regular students' score being four times greater than that of the LD students sampled. Further, on the basis of the results, suggestions can be made for ways to make the measures even more appropriate for use in the classroom, including charting procedures, time limits, and selection of word list.

PART III

DICTATED WORD LISTS: A COMPARISON OF SCORING PROCEDURES, TIME LIMITS, AND WORD LISTS

Introduction

In Part I, the dictated word list was shown to be a formative measure that was valid when compared with three different standardized achievement tests of spelling. This was demonstrated in three separate studies. In each, the measure involved having students write a word after it was presented orally by an examiner. However, different scoring procedures, time limits, and word lists were employed in the three studies. The purpose of this section is to examine the results of the studies to determine whether certain of the methods could be recommended for a formative evaluation system in spelling.

Scoring Procedures

Two major scoring methods were employed in the three studies: (a) letters in sequence, and (b) total words. These were subdivided as follows:

(1) number of letters in correct sequence

(2) number of incorrect letter sequences

(3) number of correct words

(4) number of incorrect words

In addition, rate of words and letters written correctly, and percentage of letters and words correct were examined. The scores from each of these measures were correlated with the scores from the standardized achievement measures. This procedure was done first using the data from both regular and LD program students combined.

Table 11 presents the correlations obtained between scores on correct letter sequences and scores on the achievement tests. As is evident in the table, measurement of correct letter sequences correlated highly with the three standardized achievement tests, regardless of the specific word list used.

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Insert Table 11 about here

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Table 12 gives the correlations between number of words spelled correctly and scores on the standardized tests. Again, the correlations were high regardless of the words used for the dictated word lists.

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Insert Table 12 about here

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The correlations of incorrect letter sequences and total number of incorrect words are shown in Tables 13 and 14 for the combined sample. Although significant ($p < .001$) correlations were obtained using these scoring procedures, the correlations were not of the same magnitude as those for correct letter sequences (see Table 11) and number of correct words (see Table 12).

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Insert Table 13 and 14 about here

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In order to determine whether one scoring procedure might be more feasible for either regular or LD students, correlations were calculated for each sample of children. The correlations of incorrect letter sequences and number of incorrect words with the standardized tests are shown in Tables 15 and 16, respectively. (Comparable correlations for correct letter sequences and number of correct words with the standardized tests are shown in Tables J and K in Appendix B). For the "incorrect" scoring procedures, there were many nonsignificant correlations for the LD sample. In contrast, the procedures produced moderate correlations in the sample of regular students. These results indicate that scoring incorrect letter sequences and incorrect words is not valid for the LD sample, and therefore is not a feasible procedure for a formative evaluation system.

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Insert Tables 15 and 16 about here

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In Study I, two additional methods were used to score the dictated word list. These methods involved calculating (a) the <u>percentage</u> of correct letters and correct words, and (b) the <u>rate</u> of correct letters and correct words. The correlations of these results with each other

and with the number of correct letters and correct words are shown in Tables 17, 18, and 19, for the combined sample, regular sample, and LD sample, respectively. As is evident in the tables, the results from all three scoring procedures are highly correlated. The tables also show the correlations of the various scoring procedures with the standardized achievement test used in Study I, the Test of Written Spelling. These correlations were quite high also.

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Insert Tables 17, 18, and 19 about here

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For Study III data, percentages of correct letter sequences were correlated across the four lists and with the spelling section of the Stanford Achievement Test. Similar correlations were calculated for percentages of correct words. The correlations are shown in Table 20. Moderate correlations of the percentage scores with the SAT were obtained, with the correlations for number of correct words slightly higher than for letters in correct sequence. The method of scoring percentage correct had high correlations among the four word lists for all groups.

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Insert Table 20 about here

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Time Limits

In Study I, there were no differences in the time limits employed - the three PP-6 lists were presented for three minutes each. However, while each word list was presented for three minutes in Studies II and III, the examiner recorded the student's progress after one, two, and three minutes. The differences in the results obtained from successive one minute samples and the combination of one-minute samples were investigated.

The results from successive one minute samples were examined by combining the data of Studies II and III for three of the word lists. In Table 21, the intercorrelations for the three time samples are presented for the PP-1 word list. The correlations were very high for all three samples, for both letters correct and words correct.

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Insert Table 21 about here

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Tables 22 and 23 present the intercorrelations found for the PP-3 and PP-6 word lists, respectively. These data again suggest that successive one minute samples are highly correlated for both correct letter sequences and for number of correct words. The high intercorrelations were found for the various lists across the three minutes sampled.

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Insert Tables 22 and 23 about here

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Combinations of the one minute samples were analyzed to determine whether similar results would be obtained in a one minute, two minute, or three minute presentation of the word lists. The scoring procedures that seemed most feasible (letters correct in sequence and total number

of words spelled correctly) are discussed here. Similar analyses for the other scoring procedures were conducted; the results are presented in Appendix B in Tables L-O.

Data on the correlations between letters in correct sequence and scores on standardized achievement tests from Studies II and III are presented in Tables 24 and 25, respectively. The correlations are highly similar for the one, two, and three minute time samples. These findings were consistent whether the data were from regular students only, LD students only, or the combined sample. The one exception was the Ordered word list in Study II. The Ordered list was comprised of words from preprimer to sixth grade, presented in order of difficulty. Scores on this list showed only moderate correlations with scores on the PIAT. In Table 24, the results for the LD group were consistent but resulted in low correlations. This might be due to the small sample size (N = 10).

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Insert Tables 24 and 25 about here

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Tables 26 and 27 show the differences between one, two, and three minute time samples for total number of words spelled correctly. The data are intercorrelated with the number correct on the PIAT and SAT spelling subtests. Again, although the correlations were highly consistent across the three time limits, the Ordered list in Study II had only a moderate correlation with the PIAT for the first minute. In this study, the LD sample showed fairly consistent low correlations. Again, these findings may be due to the small sample size (N = 10).

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Insert Tables 26 and 27 about here

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In all analyses (see Tables 24-27), there appeared to be a slight increase in the correlations as the time limit increased. This suggests that a three-minute sample might be the best. However, one must judge the relative increase in the correlations against the feasibility of the increased time required for the formative evaluation.

Word Lists

The word lists in Study I were three different lists randomly selected from the Harris-Jacobson word list from preprimer to sixth grade level. Table 28 shows the correlations among the number of correct letters and words on each of the three PP-6 lists. In addition, the correlations of these with the standardized measure are presented. As is evident in the table, the three lists correlated highly with each other for both correct letter sequences and words; the correlations with the standardized measure were also high.

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Insert Table 28 about here

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Table 29 presents similar correlations for the results from Study II. In Study II, the four word lists were: PP-1, PP-3, PP-6, and an Ordered list. These data suggest that the four lists were highly similar; high correlations were obtained. The lowest correlations appeared for the Ordered list and the standardized measure, the PIAT spelling subtest.

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Insert Table 29 about here

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A similar correlational matrix was tabulated for Study III data. The four word lists were PP-1, PP-3, PP-6, and Ginn (3). While the words in the other lists were selected on a random basis from the Harris-Jacobson word list, the Ginn (3) list was developed by selecting words from the cumulative word list in Inside Out, Level 9 of the Ginn 720 reading series. The standardized measure in Study III was the SAT spelling subtest. The correlations are presented in Table 30. The

intercorrelations among the various lists and with the SAT were high.

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Insert Table 30 about here

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Because Studies II and III employed the same words in the PP-1, PP-3, and PP-6 lists, these results were combined for analysis. Table 31 shows the correlations among the word lists for letters correct in sequence and number of words spelled correctly for a three-minute sample. All correlations were very high.

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Insert Table 31 about here

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Table 32 shows the correlations obtained for the three lists when scored in terms of letters incorrect and words incorrect. Again, most correlations were moderate to high. Those that were lower seemed to be due to the LD sample.

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Insert Table 32 about here

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Comparisons of the various word lists were also discussed in Part II. The graphs of the scores on the different words lists showed similar curves across grade levels. The PP-1 list tended to be somewhat easier than PP-3, which in turn was easier than PP-6. Overall, the curves were very similar, including the Ordered list and the Ginn (3) list. Those results support those found here.

Discussion

The section reviewed differences in scoring procedures, time limits, and words used on the dictated word list. These variables of the dictated word list were examined because it was the formative measure of spelling that was found to be highly correlated with various standardized measures of spelling (see Part I).

Various scoring procedures were compared. Similar results were obtained for correct letter sequences and words, incorrect letter sequences and words, percentage correct, and rate correct, when the combined samples were analyzed. However, when the sample was subdivided into regular and LD children, the scoring of incorrect letter sequences and words produced low or nonsignificant results. Therefore, this type of scoring is not recommended for a formative evaluation system in spelling.

In Study I, percentage correct and rate correct were found to be similar to correct letter sequences and words. The results of Study III demonstrated moderate correlations for percentage correct. Percentage correct and rate correct are not recommended as highly as scoring number of correct letters or words because they are more time-consuming procedures. In addition, the percentage correct procedure may be biased in that students who attempt fewer words and get them correct will attain higher percentage scores. In other words, it is not necessary to compute percentage correct and rate correct since similar or better results can be obtained using correct letters or correct words.

Similar results were obtained for the one, two, and three minute time limits. The only discrepancy was for the first minute on the

Ordered list in Study II. It seems that each successive minute is measuring the same thing. These results indicated that even though there is a slight increase in correlations over time, one, two, or three minute time limits could be employed to index achievement in a formative evaluation system in spelling.

The words which comprise the dictated lists may be selected from various grade levels on a random basis or nonrandomly selected from a basal reader. The results were highly consistent when the various lists were compared to each other and the standardized measure. The exception to these findings was the Ordered list in Study II, where somewhat lower correlations were found. The Ordered list consisted of 10 words from each grade level. Because there was a three minute time limit, not all grade levels were presented in the list. In a follow-up study, another Ordered list may be developed which contains fewer words at each level. The benefit of such a list is to serve as a quick check on an individual's skills in spelling along a developmental dimension.

In summary, the data presented in this section suggest that a teacher may select any words, present them for one to three minutes in a dictated list, and tabulate number of correct letter sequences or total number of words spelled correctly, to establish a formative evaluation procedure for spelling.

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Table 1

Correlational Matrix of Correct Responses on Two Formative Measures and the TWS for Regular and LD Program Students Combined[a]

	Dictated Word Lists[b]						Written Sample[c]		TWS
	List 1		List 2		List 3				
	Letters	Words	Letters	Words	Letters	Words	Number	Percent	Total
List 1									
Letters	.95		.93	.82	.94	.84	.84	.88	.85
Words			.91	.82	.90	.83	.61	.81	.87
List 2									
Letters			.94		.97	.93	.74	.80	.94
Words					.91	.93	.72	.74	.96
List 3									
Letters						.95	.80	.92	.93
Words							.70	.78	.95
Written Sample									
Number								.64	.71
Percent									.70
TWS									
Total									

[a]Combined sample included 42 students (27 regular, 15 LD). All correlations significant at $p = .001$.

[b]Each list was PP-6, administered for three minutes.

[c]Written sample was administered for five minutes.

Table 2

Correlational Matrix of Correct Responses on Two Formative Measures and the TWS for Regular Program Students[a]

	Dictated Word Lists[b]		Written Sample[c]		TWS
	Letters	Words	Number	Percent	Total
Dictated Lists					
Letters		.96	.64	.78	.90
Words			.68	.75	.95
Written Sample					
Number				.55	.69
Percent					.72
TWS					
Total					

[a]Sample included 27 students. All correlations significant at $p = .001$.

[b]Correlations are for three PP-6 lists combined. The lists were administered for three minutes each.

[c]Written sample was administered for five minutes.

Table 3

Correlational Matrix of Correct Responses on Two Formative Measures and the TWS for LD Program Students[a]

	Dictated Word Lists[b]		Written Sample[c]		TWS
	Letters	Words	Number	Percent	Total
Dictated Lists					
Letters		.95[d]	.68	.67	.89[d]
Words			.63	.67	.97[d]
Written Sample					
Number				.72[d]	.59
Percent					.64
TWS					
Total					

[a]Sample included 15 students.

[b]Correlations are for three PP-6 lists combined. The lists were administered for three minutes.

[c]Written sample was administered for five minutes.

[d]Significant at $p = .001$; all other correlations significant at $p \leq .01$.

Table 4

Correlational Matrix of Correct Responses on Four Dictated Word Lists and the PIAT for Regular and LD Program Students Combined[a]

	PP-1		PP-3		PP-6		Ordered		PIAT
	Letters	Words	Letters	Words	Letters	Words	Letters	Words	Total
PP-1									
Letters		.99	.93	.90	.90	.85	.95	.94	.81
Words			.94	.93	.91	.89	.94	.95	.85
PP-3									
Letters				.97	.95	.93	.95	.93	.87
Words					.95	.97	.92	.92	.91
PP-6									
Letters						.96	.91	.91	.90
Words							.87	.89	.94
Ordered									
Letters								.99	.80
Words									.83
PIAT									
Total									

[a]Combined sample included 45 students (35 regular, 10 LD). Each word list was administered for three minutes. All correlations significant at $p = .001$.

Table 5

Correlational Matrix of Correct Responses on Four Dictated Word Lists and the PIAT for Regular Program Students[a]

	PP-1		PP-3		PP-6		Ordered		PIAT
	Letters	Words	Letters	Words	Letters	Words	Letters	Words	Total
PP-1									
Letters		.99	.94	.91	.90	.87	.96	.93	.82
Words			.95	.94	.91	.90	.95	.94	.85
PP-3									
Letters				.98	.95	.94	.94	.93	.87
Words					.95	.97	.92	.92	.91
PP-6									
Letters						.97	.92	.91	.90
Words							.90	.91	.93
Ordered									
Letters								.99	.81
Words									.83
PIAT									
Total									

[a]Sample included 35 students. All correlations significant at $p = .001$.

Table 6

Correlational Matrix of Correct Responses on Four Dictated Word Lists and the PIAT for LD Program Students[a]

	PP-1		PP-3		PP-6		Ordered		PIAT
	Letters	Words	Letters	Words	Letters	Words	Letters	Words	Total
PP-1									
Letters		.95**	.84**	.79**	.78**	.37	.92**	.91**	.44
Words			.74**	.73**	.63*	.47	.84**	.89**	.53
PP-3									
Letters				.97**	.78**	.17	.94**	.87**	.29
Words					.69*	.25	.89**	.82**	.35
PP-6									
Letters						.45	.84**	.73**	.53
Words							.30	.33	.95**
Ordered									
Letters								.97**	.44
Words									.49
PIAT									
Total									

[a]Sample included 10 students. Significance levels are denoted as follows:

* $p \leq .05$
** $p \leq .01$

Other correlations are nonsignificant.

Table 7

Correlational Matrix of Correct Letter Sequences on Four Dictated Word Lists and Total Correct on the Stanford-Spelling for Combined, Regular, and LD Samples[a]

	PP-1	PP-3	PP-6	Ginn (3)	Stanford
Combined Sample[b]					
PP-1		.95	.91	.95	.80
PP-3			.97	.96	.85
PP-6				.96	.86
Ginn (3)					.86
Regular Sample[c]					
PP-1		.93	.90	.95	.76
PP-3			.96	.96	.86
PP-6				.95	.86
Ginn (3)					.86
LD Sample[d]					
PP-1		.95	.92	.93	.78
PP-3			.96	.95	.78
PP-6				.96	.82
Ginn (3)					.81

[a]All correlations significant at $p = .001$.

[b]Sample included 61 students.

[c]Sample included 32 students.

[d]Sample included 29 students.

Table 8

Correlational Matrix of Number of Correct Words on Four Dictated Lists and Total Correct on Stanford-Spelling for Combined, Regular, and LD Samples [a]

	PP-1	PP-3	PP-6	Ginn (3)	Stanford
Combined Sample[b]					
PP-1		.93	.89	.93	.83
PP-3			.96	.96	.88
PP-6				.95	.87
Ginn (3)					.89
Regular Sample[c]					
PP-1		.93	.89	.93	.80
PP-3			.95	.96	.90
PP-6				.94	.86
Ginn (3)					.89
LD Sample[d]					
PP-1		.93	.88	.90	.80
PP-3			.96	.95	.82
PP-6				.96	.83
Ginn (3)					.84

[a] All correlations significant at $p = .001$.

[b] Sample included 61 students.

[c] Sample included 32 students.

[d] Sample included 29 students.

Table 9

Results of t test Comparisons of the Performance of Regular and LD Program Students

Measure	t[a]	Probability
TWS	4.84	.001
Correct Letter Sequences		
Number	4.59	.001
Percent	4.71	.001
Rate	4.56	.001
Correct Words		
Number	4.88	.001
Percent	4.68	.001
Rate	4.69	.001
Written Sample Words Correct		
Number	2.47	.018
Percent	6.56	.001

[a] *t* values were calculated using the pooled variance estimate. All tests involved 40 *df* and used a two-tailed probability level.

Table 10

Letters Correct by Grade and Group

Grade/Group	Mean Number	Percentage	Rate[a]
Grade 2			
Regular	11.1	37	11.1
LD	10.7	40	10.2
Grade 3			
Regular	38.0	76	40.7
LD	21.2	39	21.3
Grade 4			
Regular	47.1	88	58.5
LD	23.3	56	23.3
Grade 5			
Regular	49.2	89	56.4
LD	29.6	65	30.8
Grade 6			
Regular	50.1	90	71.9
LD	33.1	67	33.2

[a] Rate refers to the number of letters correct per minute.

Table 11

Correlations of Number of Correct Letter Sequences on Dictated Word Lists with Number Correct on Standardized Spelling Achievement Tests in Three Studies

Study [a]	List	Standardized Test	Correlation [b]
I	PP-6	TWS	.86
	PP-6	TWS	.94
	PP-6	TWS	.93
II	PP-1	PIAT	.81
	PP-3	PIAT	.87
	PP-6	PIAT	.90
	Ordered	PIAT	.80
III	PP-1	SAT	.80
	PP-3	SAT	.85
	PP-6	SAT	.86
	Ginn (3)	SAT	.86

[a] For each study, data include the scores of regular and LD program students combined (Study I: 27 regular, 15 LD; Study II: 35 regular, 10 LD; Study III: 32 regular, 29 LD).

[b] All correlations significant at $p = .001$.

Table 12

Correlations of Number of Correct Words on Dictated Word Lists with Number Correct on Standardized Spelling Achievement Tests in Three Studies

Study[a]	List	Standardized Test	Correlation[b]
I	PP-6	TWS	.87
	PP-6	TWS	.96
	PP-6	TWS	.95
II	PP-1	PIAT	.85
	PP-3	PIAT	.91
	PP-6	PIAT	.94
	Ordered	PIAT	.83
III	PP-1	SAT	.83
	PP-3	SAT	.88
	PP-6	SAT	.87
	Ginn (3)	SAT	.89

[a]For each study, data include the scores of regular and LD program students combined (Study I: 27 regular, 15 LD; Study II: 35 regular, 10 LD; Study III: 32 regular, 29 LD).

[b]All correlations significant at $p = .001$.

Table 13

Correlations of Number of Incorrect Letter Sequences on Dictated Word Lists with Number Correct on Standardized Spelling Achievement Tests in Three Studies

Study[a]	List	Standardized Test	Correlation[b]
I	PP-6	TWS	-.81
	PP-6	TWS	-.83
	PP-6	TWS	-.80
II	PP-1	PIAT	-.77
	PP-3	PIAT	-.66
	PP-6	PIAT	-.58
	Ordered	PIAT	-.67
III	PP-1	SAT	-.71
	PP-3	SAT	-.65
	PP-6	SAT	-.55
	Ginn (3)	SAT	-.70

[a]For each study, data include the scores of regular and LD program students combined (Study I: 27 regular, 15 LD; Study II: 35 regular, 10 LD; Study III: 32 regular, 29 LD).

[b]All correlations significant at $p = .001$.

Table 14

Correlations of Number of Incorrect Words on Dictated Word Lists with Number Correct on Standardized Spelling Achievement Tests in Two Studies[a]

Study[b]	List	Standardized Test	Correlation[c]
II	PP-1	PIAT	-.80
	PP-3	PIAT	-.73
	PP-6	PIAT	-.67
	Ordered	PIAT	-.67
III	PP-1	SAT	-.71
	PP-3	SAT	-.59
	PP-6	SAT	-.51
	Ginn (3)	SAT	-.67

[a]Correlations were not computed for Study I.

[b]For each study, data include the scores of regular and LD program students combined (Study II: 35 regular, 10 LD; Study III: 32 regular, 29 LD).

[c]All correlations significant at $p = .001$.

Table 15

Correlations of Number of Incorrect Letter Sequences on Dictated Word Lists with Number Correct on Standardized Spelling Achievement Tests for Regular and LD Students in Two Studies[a]

Study	List	Standardized Test	Correlation	
			Regular[b]	LD[c]
II	PP-1	PIAT	-.78	-.07
	PP-3	PIAT	-.70	.42
	PP-6	PIAT	-.62	.48
	Ordered	PIAT	-.68	.14
III	PP-1	SAT	-.70	-.61***
	PP-3	SAT	-.78	-.29
	PP-6	SAT	-.60	-.32*
	Ginn (3)	SAT	-.76	-.52**

[a]Correlations were not computed for Study I.

[b]Sample included 35 students in Study II and 32 students in Study III. All correlations significant at $p = .001$.

[c]Sample included 10 students in Study II and 29 students in Study III. All correlations nonsignificant except those with * ($p = .05$), ** ($p = .01$) and *** ($p = .001$).

Table 16

Correlations of Number of Incorrect Words on Dictated Word Lists with Number Correct on Standardized Spelling Achievement Tests for Regular and LD Students in Two Studies[a]

Study	List	Standardized Test	Correlation	
			Regular[b]	LD[c]
II	PP-1	PIAT	-.81	-.20
	PP-3	PIAT	-.76	.30
	PP-6	PIAT	-.72	.30
	Ordered	PIAT	-.68	-.09
III	PP-1	SAT	-.70	-.60***
	PP-3	SAT	-.74	-.13
	PP-6	SAT	-.59	-.16
	Ginn (3)	SAT	-.72	-.47**

[a]Correlations were not computed for Study I.

[b]Sample included 35 students in Study II and 32 students in Study III. All correlations significant at $p = .001$.

[c]Sample included 10 students in Study II and 29 students in Study III. All correlations nonsignificant except those with ** ($p = .01$) and *** ($p = .001$).

Table 17

Correlational Matrix of Three Scoring Procedures and TWS for Study I

Regular and LD Program Students Combined[a]

	Number Correct		% Correct		Rate Correct		TWS
	Letters	Words	Letters	Words	Letters	Words	Total Correct
Number Correct							
Letters		.97	.96	.94	.94	.91	.93
Words			.96	.99	.93	.96	.97
% Correct							
Letters				.96	.89	.90	.91
Words					.91	.95	.96
Rate Correct							
Letters						.98	.93
Words							.95
TWS							
Total							

[a]Combined sample included 42 students (27 regular, 15 LD). All correlations significant at $p = .001$.

Table 18

Correlational Matrix of Three Scoring Procedures and TWS for Study I

Regular Program Students[a]

	Number Correct		% Correct		Rate Correct		TWS
	Letters	Words	Letters	Words	Letters	Words	Total Correct
Number Correct							
Letters	.96		.93	.92	.90	.88	.90
Words			.96	.99	.90	.94	.95
% Correct							
Letters				.97	.85	.88	.87
Words					.87	.93	.93
Rate Correct							
Letters							.90
Words							.93
TWS							
Total							

[a]Sample included 27 students. All correlations significant at $p = .001$.

Table 19

Correlational Matrix of Three Scoring Procedures and TWS for Study I LD Program Students[a]

	Number Correct		% Correct		Rate Correct		TWS
	Letters	Words	Letters	Words	Letters	Words	Total Correct
Number Correct							
Letters		.95	.94	.91	.99	.96	.89
Words			.94	.98	.94	.99	.97
% Correct							
Letters				.95	.92	.94	.88
Words					.88	.97	.95
Rate Correct							
Letters						.95	.87
Words							.96
TWS							
Total							

[a]Sample included 15 students. All correlations significant at $p = .001$.

Table 20

Correlational Matrix of Percentage Correct on Four Dictated Words Lists and the Stanford for Study III Combined, Regular, and LD Samples[a]

	Letters in Correct Sequence					Number of Correct Words				
	PP-1	PP-3	PP-6	Ginn(3)	Stanford Correct	PP-1	PP-3	PP-6	Ginn(3)	Stanford Correct
Combined Sample[b]										
PP-1		.92	.89	.92	.70		.91	.85	.88	.75
PP-3			.95	.95	.74			.93	.94	.81
PP-6				.95	.77				.92	.82
Ginn(3)					.79					.86
Regular Sample[c]										
PP-1		.93	.89	.96	.69		.92	.82	.89	.73
PP-3			.92	.95	.77			.90	.92	.82
PP-6				.93	.79				.89	.82
Ginn(3)					.81					.86
LD Sample[d]										
PP-1		.91	.88	.88	.65		.91	.86	.85	.70
PP-3			.96	.93	.61			.94	.92	.73
PP-6				.96	.65				.93	.74
Ginn(3)					.68					.81

[a]All correlations significant at $p = .001$.

[b]Combined sample included 61 students (32 regular, 29 LD).

[c]Sample included 32 students.

[d]Sample included 29 students.

Table 21

Correlational Matrix of Correct Responses on PP-1 List for Three Successive One-Minute Samples for Combined, Regular, and LD Students[a]

		Letters in Correct Sequence			Number of Words Correct		
		1st Min	2nd Min	3rd Min	1st Min	2nd Min	3rd Min
Letters in Correct Sequence							
Combined Sample:	1st		.93	.92	.98	.92	.92
	2nd			.89	.92	.98	.89
	3rd				.90	.87	.98
Regular Sample:	1st		.94	.90	.98	.92	.90
	2nd			.88	.93	.98	.90
	3rd				.88	.87	.99
LD Sample:	1st		.91	.94	.98	.89	.92
	2nd			.88	.87	.97	.86
	3rd				.93	.85	.98
Number of Words Correct							
Combined Sample:	1st					.92	.91
	2nd						.88
	3rd						
Regular Sample:	1st					.92	.89
	2nd						.89
	3rd						
LD Sample:	1st					.87	.93
	2nd						.84
	3rd						

[a]Data are from Studies II and III (Combined N=106, Regular N=67, LD N=39). All correlations significant at $p=.001$.

Table 22

Correlational Matrix of Correct Responses on PP-3 List for Three Successive One-Minute Samples for Combined, Regular, and LD Students[a]

		Letters in Correct Sequence			Number of Words Correct		
		1st Min	2nd Min	3rd Min	1st Min	2nd Min	3rd Min
Letters in Correct Sequence							
Combined Sample:	1st		.92	.91	.98	.83	.86
	2nd			.90	.91	.95	.87
	3rd				.90	.83	.94
Regular Sample:	1st		.91	.90	.98	.83	.85
	2nd			.88	.91	.95	.88
	3rd				.90	.86	.95
LD Sample:	1st		.92	.89	.98	.78	.82
	2nd			.86	.90	.92	.77
	3rd				.86	.69	.91
Number of Words Correct							
Combined Sample:	1st					.84	.87
	2nd						.84
	3rd						
Regular Sample:	1st					.85	.87
	2nd						.85
	3rd						
LD Sample:	1st					..76	.80
	2nd						.63
	3rd						

[a]Data are from Studies II and III (Combined N=106, Regular N=67, LD N=39). All correlations are significant at $p=.001$.

Table 23

Correlational Matrix of Correct Responses on PP-6 List for Three Successive One-Minute Samples for Combined, Regular, and LD Students[a]

		Letters in Correct Sequence			Number of Words Correct		
		1st Min	2nd Min	3rd Min	1st Min	2nd Min	3rd Min
Letters in Correct Sequence							
Combined Sample:	1st		.88	.88	.97	.81	.77
	2nd			.90	.87	.94	.82
	3rd				.87	.87	.92
Regular Sample:	1st		.89	.74	.98	.81	.74
	2nd			.89	.87	.94	.78
	3rd				.85	.86	.92
LD Sample:	1st		.82	.89	.93	.75	.78
	2nd			.85	.80	.94	.85
	3rd				.89	.84	.90
Number of Words Correct							
Combined Sample:	1st					.83	.79
	2nd						.81
	3rd						
Regular Sample:	1st					.82	.75
	2nd						.79
	3rd						
LD Sample:	1st					.78	.80
	2nd						.79
	3rd						

[a]Data are from Studies II and III (Combined N=106, Regular N=67, LD N=39). All correlations significant at $p=.001$.

Table 24

Correlations of Correct Letter Sequence Scores from Different Time Samples with Number Correct on the PIAT in Study II[a]

	First Minute	First 2 Minutes	3 Minutes
Combined Sample[b]			
PP-1	.82	.81	.81
PP-3	.85	.87	.87
PP-6	.86	.88	.90
Ordered	.67	.77	.80
Regular Sample[c]			
PP-1	.83	.81	.82
PP-3	.85	.88	.88
PP-6	.86	.88	.90
Ordered	.70	.78	.81
LD Sample[d]			
PP-1	.38^{ns}	.49*	.44*
PP-3	.35^{ns}	.33^{ns}	.29^{ns}
PP-6	.62**	.59**	.53*
Ordered	.33^{ns}	.48*	.44*

[a]All correlations significant at $p = .001$, except those with ns (nonsignificant), * ($p < .10$), and ** ($p < .05$).

[b]Sample included 45 students

[c]Sample included 35 students

[d]Sample included 10 students

Table 25

Correlations of Correct Letter Sequence Scores from Different Time Samples with Number Correct on the Stanford-Spelling in Study III[a]

	First Minute	First 2 Minutes	3 Minutes
Combined Sample[b]			
PP-1	.79	.77	.80
PP-3	.83	.85	.85
PP-6	.82	.86	.86
Ginn (3)	.84	.86	.86
Regular Sample[c]			
PP-1	.74	.73	.76
PP-3	.83	.84	.86
PP-6	.81	.84	.86
Ginn (3)	.80	.84	.86
LD Sample[d]			
PP-1	.77	.75	.78
PP-3	.79	.80	.78
PP-6	.77	.83	.82
Ginn (3)	.84	.83	.81

[a]All correlations significant at $p = .001$.

[b]Sample included 61 students.

[c]Sample included 32 students.

[d]Sample included 29 students.

Table 26

Correlations of Number of Correct Words on Dictated Lists from Different Time Samples with Number Correct on the PIAT in Study II[a]

	First Minute	First 2 Minutes	3 Minutes
Combined Sample[b]			
PP-1	.87	.86	.85
PP-3	.86	.90	.91
PP-6	.87	.92	.94
Ordered	.69	.81	.83
Regular Sample[c]			
PP-1	.88	.86	.85
PP-3	.86	.90	.91
PP-6	.85	.91	.93
Ordered	.71	.80	.83
LD Sample[d]			
PP-1	.41^{ns}	.56**	.53*
PP-3	.37^{ns}	.42^{ns}	.35^{ns}
PP-6	.91	.84	.95
Ordered	.28^{ns}	.47*	.49*

[a]All correlations significant at $p = .001$, except those with ns (nonsignificant), * ($p < .10$), and ** ($p < .05$).

[b]Sample included 45 students.

[c]Sample included 35 students.

[d]Sample included 10 students.

Table 27

Correlations of Number of Correct Words on Dictated Lists from Different Time Samples with Number Correct on the Stanford in Study III[a]

	First Minute	First 2 Minutes	3 Minutes
Combined Sample[b]			
PP-1	.83	.80	.83
PP-3	.85	.86	.88
PP-6	.82	.87	.87
Ginn (3)	.85	.88	.89
Regular Sample[c]			
PP-1	.80	.78	.80
PP-3	.87	.88	.90
PP-6	.83	.87	.86
Ginn (3)	.82	.87	.89
LD Sample[d]			
PP-1	.79	.76	.80
PP-3	.78	.80	.82
PP-6	.73	.83	.83
Ginn (3)	.83	.85	.84

[a]All correlations significant at $p = .001$.

[b]Sample included 61 students.

[c]Sample included 32 students.

[d]Sample included 29 students.

Table 28

Correlational Matrix of Correct Responses on Dictated Word Lists and the TWS for Regular and LD Program Students Combined[a]

	Dictated Word Lists[b]					
	List 1		List 2		List 3		TWS
	Letters	Words	Letters	Words	Letters	Words	Total
List 1							
Letters	.95	.93	.82	.94	.84	.85
Words		.91	.82	.90	.83	.87
List 2						
Letters			.94	.97	.93	.94
Words				.91	.93	.96
List 3						
Letters					.95	.93
Words						.95

[a]Combined sample included 42 students (27 regular, 15 LD). All correlations significant at $p = .001$.

[b]Each list was PP-6, administered for three minutes.

Table 29

Correlational Matrix of Correct Responses on Four Dictated Word Lists and the PIAT for Regular and LD Program Students Combined[a]

	PP-1		PP-3		PP-6		Ordered		PIAT
	Letters	Words	Letters	Words	Letters	Words	Letters	Words	Total
PP-1									
Letters		.99	.93	.90	.90	.85	.95	.94	.81
Words			.94	.93	.91	.89	.94	.95	.85
PP-3									
Letters				.97	.95	.93	.95	.93	.87
Words					.95	.97	.92	.92	.91
PP-6									
Letters						.96	.91	.91	.90
Words							.87	.89	.94
Ordered									
Letters								.99	.80
Words									.83

[a]Sample included 45 students (35 regular, 10 LD). All correlations significant at .001.

Table 30

Correlational Matrix of Correct Responses on Four Dictated Word Lists and the Stanford for Regular and LD Program Students Combined[a]

	PP-1		PP-3		PP-6		Ginn (3)		Stanford
	Letters	Words	Letters	Words	Letters	Words	Letters	Words	Correct
PP-1									
Letters			.95		.91		.95		.80
Words				.93		.89		.93	.83
PP-3									
Letters					.97		.96		.85
Words						.96		.96	.88
PP-6									
Letters							.96		.86
Words								.95	.87
Ginn (3)									
Letters									.86
Words									.89

[a]Sample included 61 students (32 regular, 29 LD). All correlations significant at $p = .001$.

Table 31

Correlational Matrix of Correct Responses on Three Dictated Word Lists Used in Studies II and III[a]

	Letters in Correct Sequence			Number of Correct Words		
	PP-1	PP-3	PP-6	PP-1	PP-3	PP-6
Combined Sample[b]						
PP-1		.94	.91		.93	.89
PP-3			.96			.96
PP-6						
Regular Sample[c]						
PP-1		.94	.90		.93	.89
PP-3			.95			.96
PP-6						
LD Sample[d]						
PP-1		.93	.90		.91	.85
PP-3			.95			.93
PP-6						

[a] All correlations significant at $p = .001$.

[b] Sample included 106 students.

[c] Sample included 67 students.

[d] Sample included 39 students.

Table 32

Correlational Matrix of Incorrect Responses on Three Dictated Word Lists Used in Studies II and III[a]

	Letters in Incorrect Sequence			Number of Incorrect Words		
	PP-1	PP-3	PP-6	PP-1	PP-3	PP-6
Combined Sample[b]						
PP-1		.79	.68		.79	.70
PP-3			.91			.91
PP-6						
Regular Sample[c]						
PP-1		.84	.70		.83	.74
PP-3			.89			.90
PP-6						
LD Sample[d]						
PP-1		.59	.52		.56	.46*
PP-3			.93			.89
PP-6						

[a]All correlations significant at $p = .001$, except that with * ($p < .01$).

[b]Sample included 106 students.

[c]Sample included 61 students.

[d]Sample included 39 students.

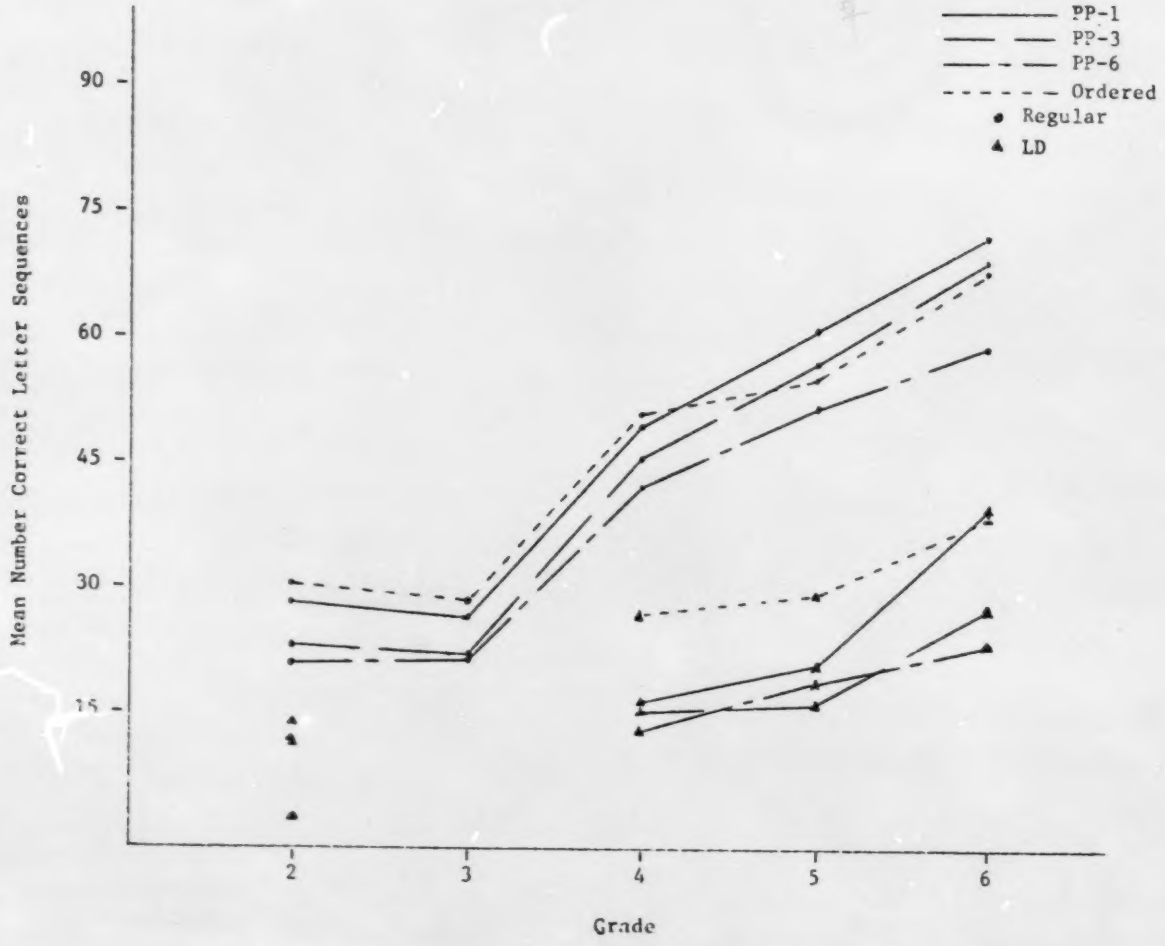

Figure 1. Letters in Correct Sequence by Grade and Group in Study II.

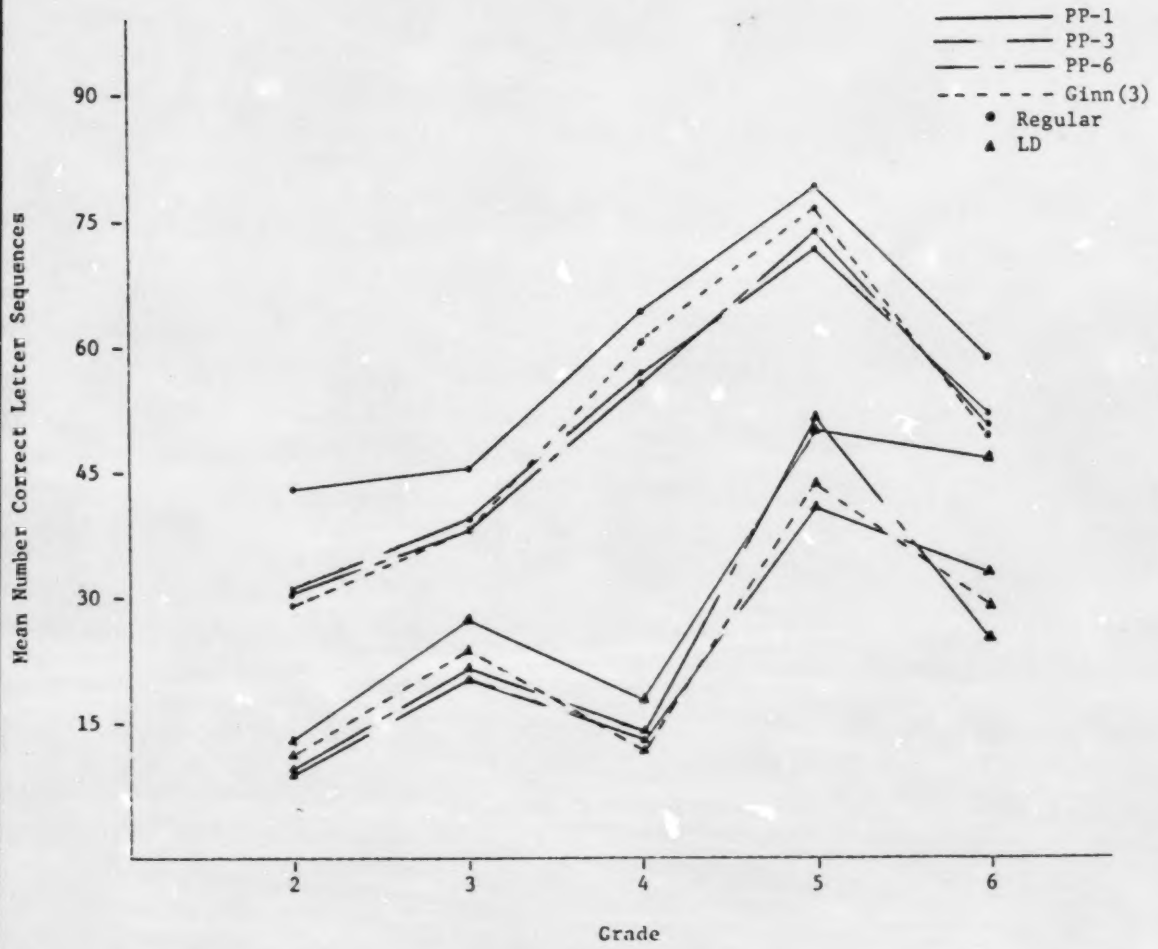

Figure 2. Letters in Correct Sequence by Grade and Group in Study III.

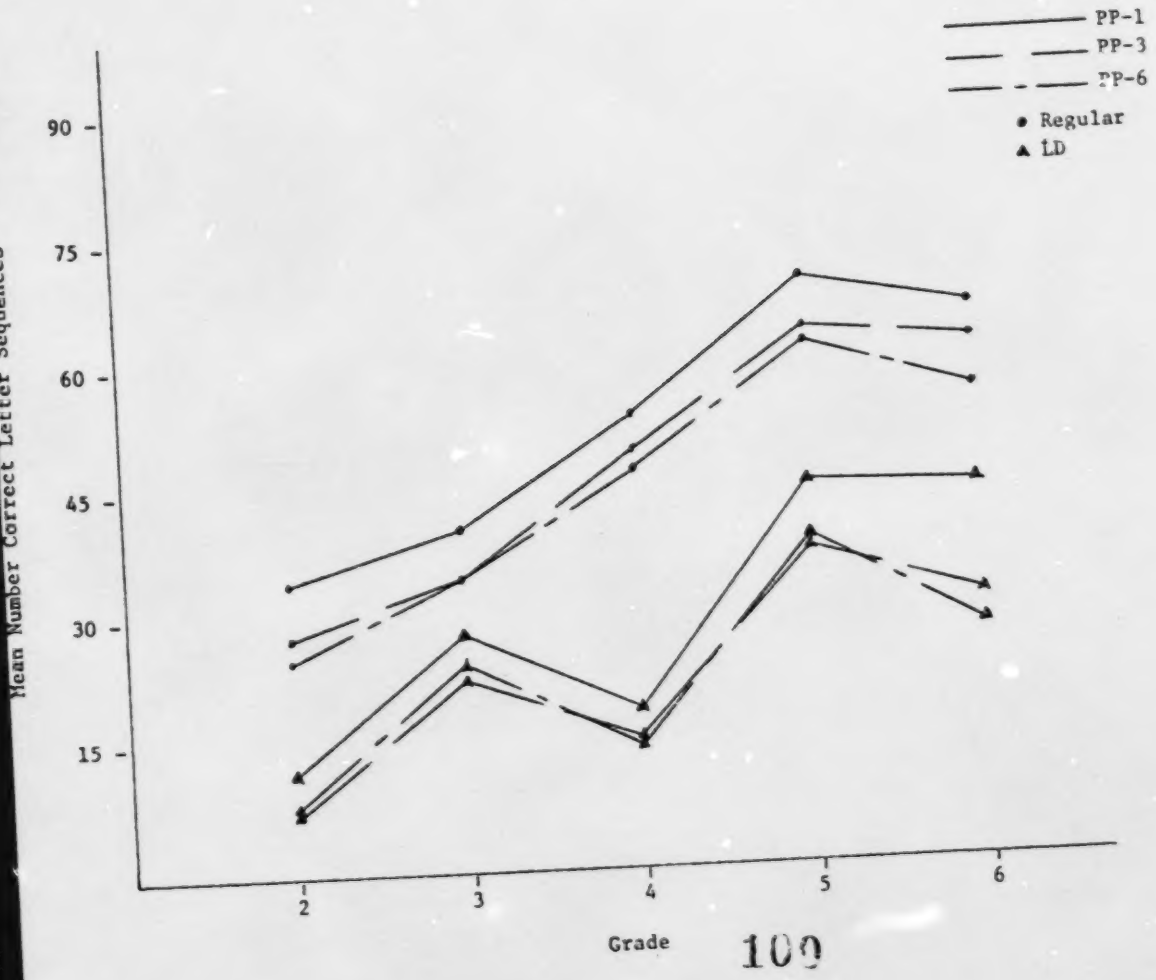

Figure 3. Letters in Correct Sequence by Grade and Group in Studies II and III Combined.

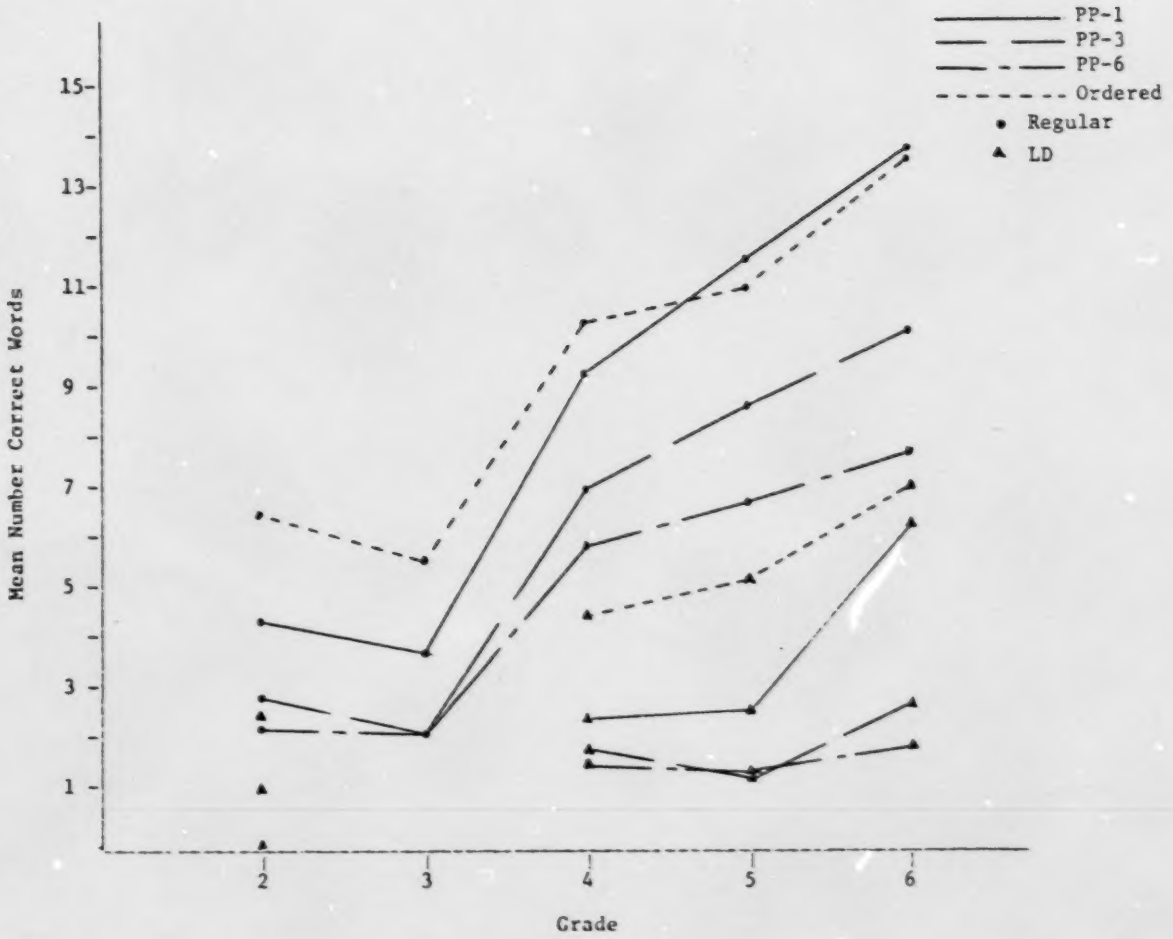

Figure 4. Number of Correct Words by Grade and Group in Study II.

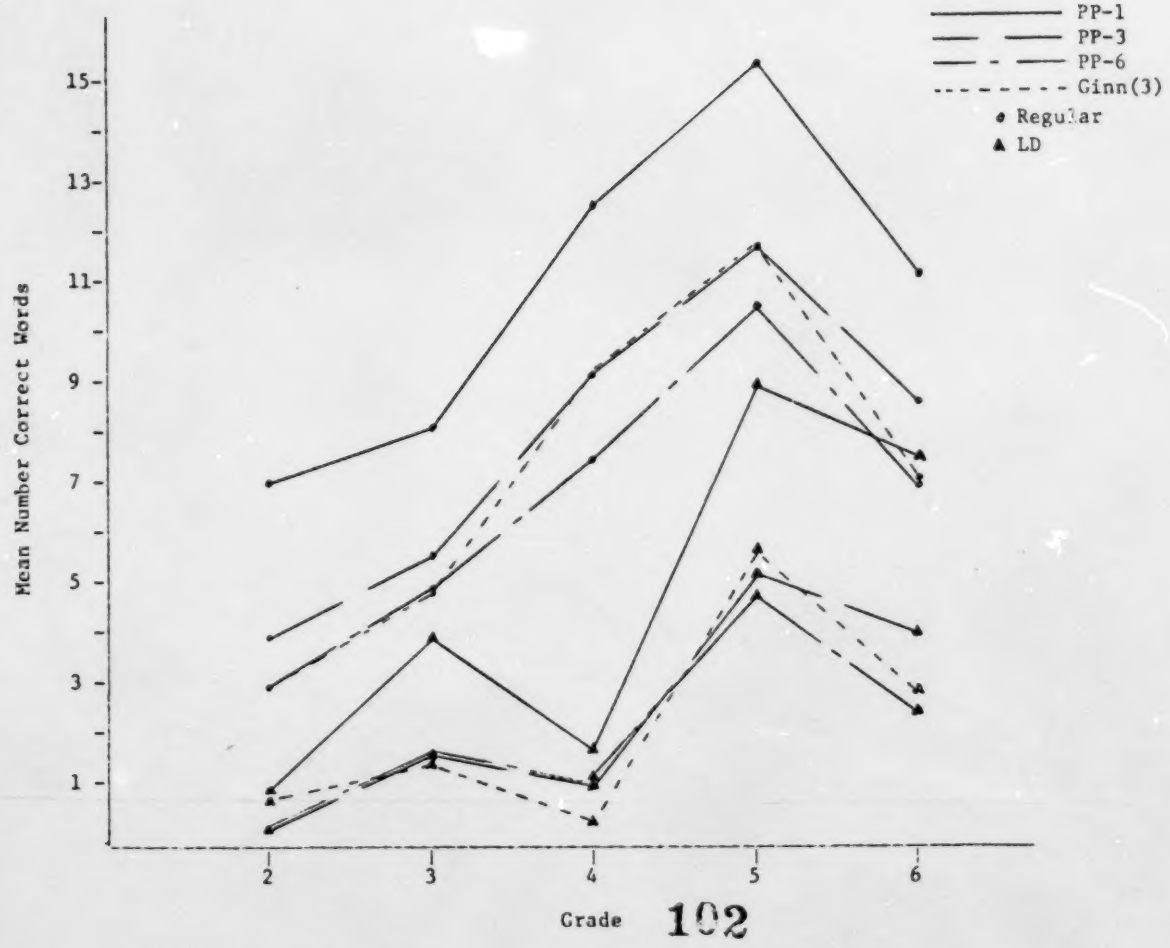

Figure 5. Number of Correct Words by Grade and Group in Study III.

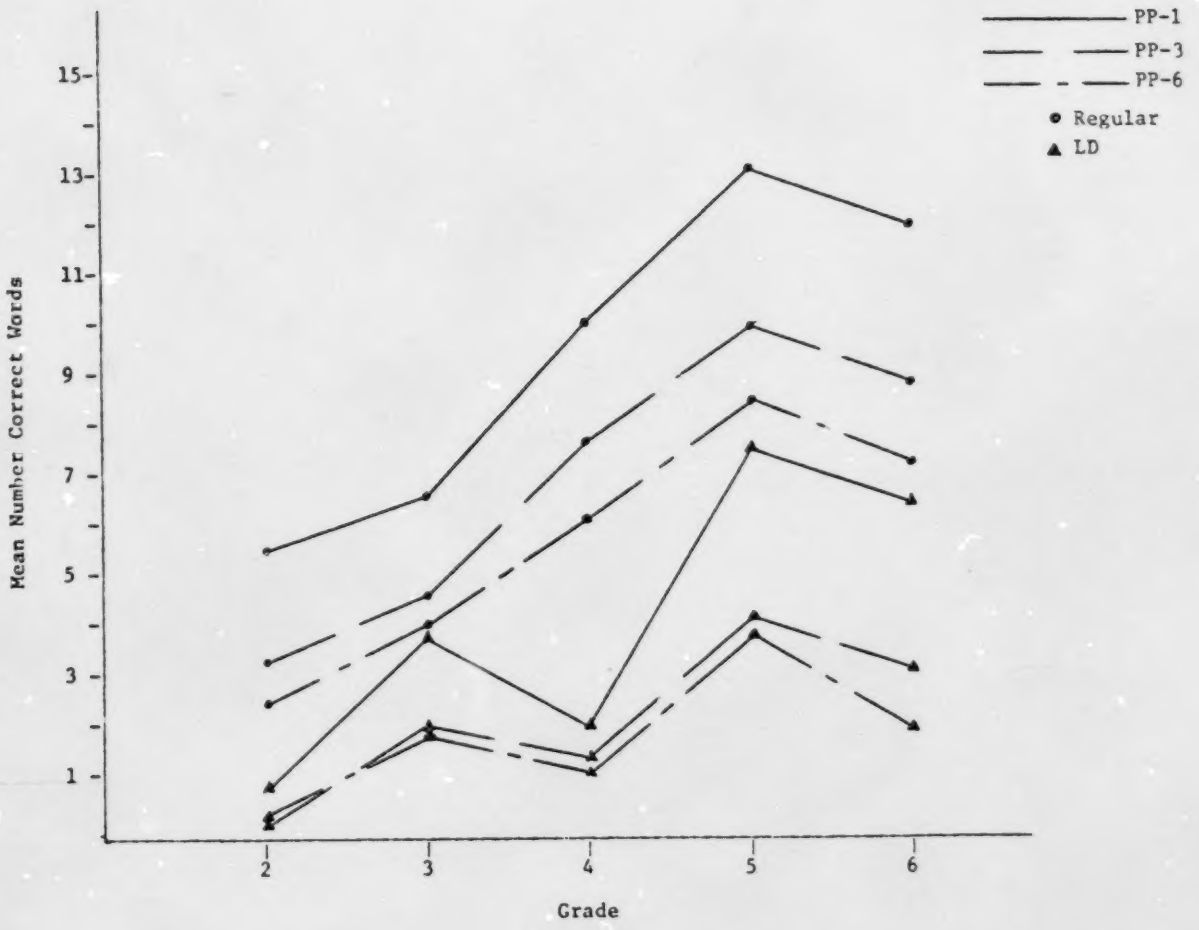

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Figure 6. Number of Correct Words by Grade and Group in Studies II and III Combined.

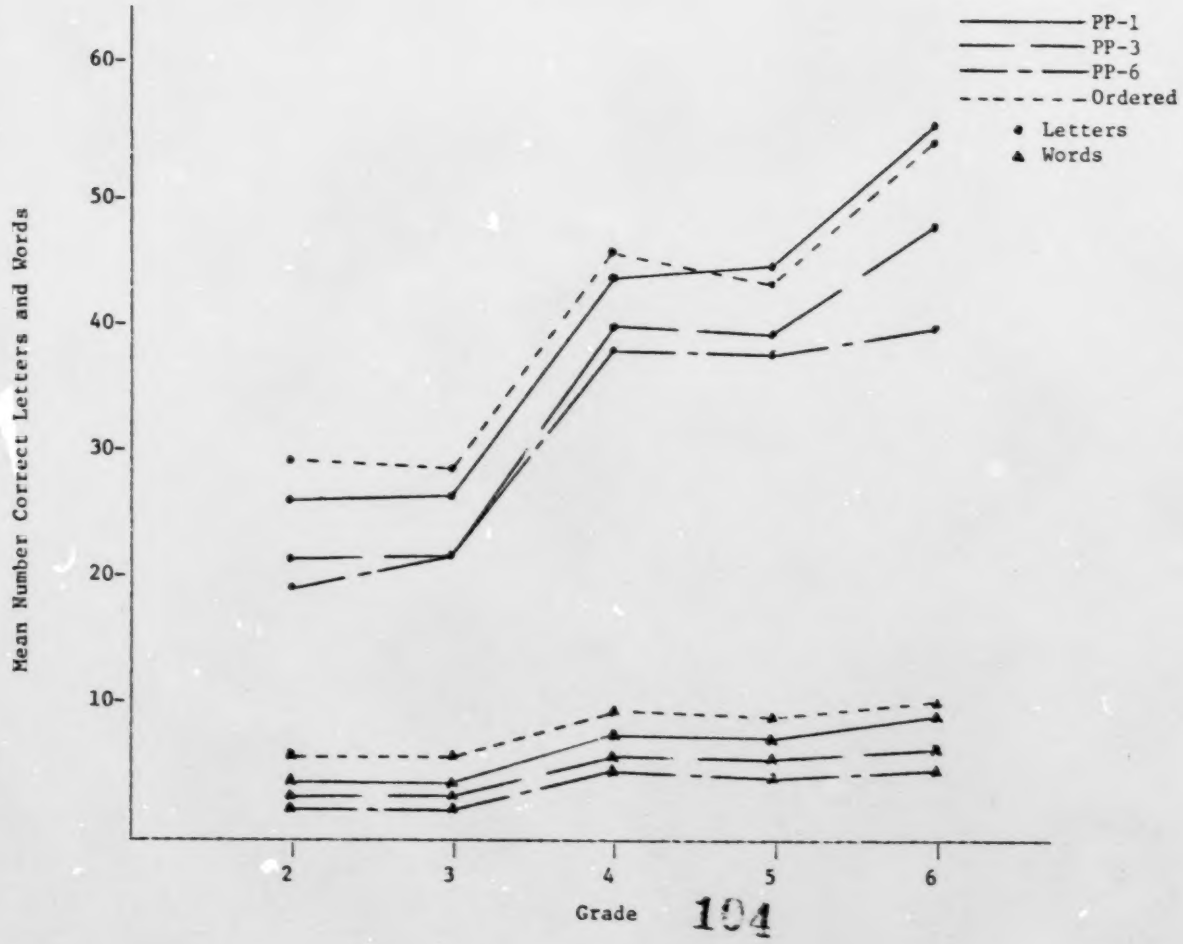

Figure 7. Letters and Words Correct by Grade in Study II for Combined Samples (N=45).

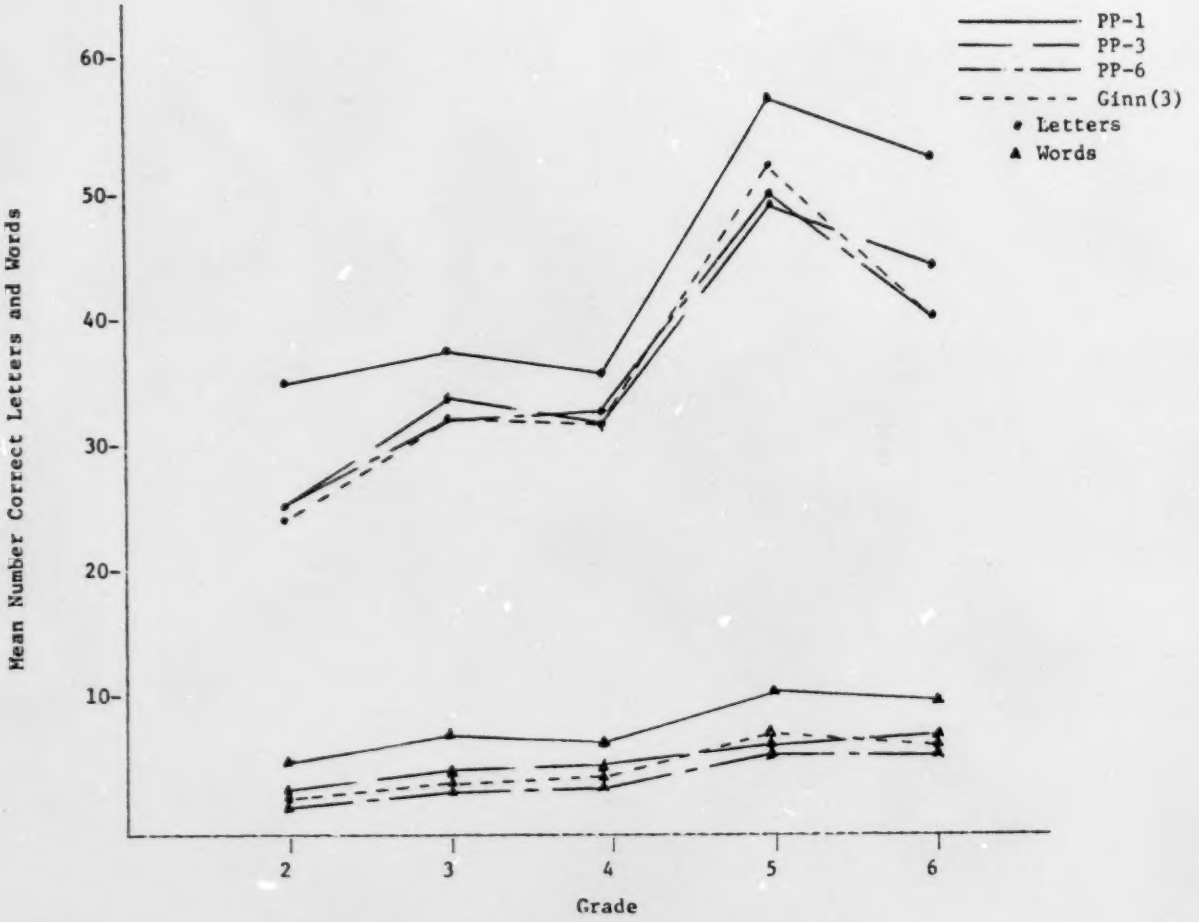

Figure 8. Letters and Words Correct by Grade in Study III for Combined Samples (N=61).

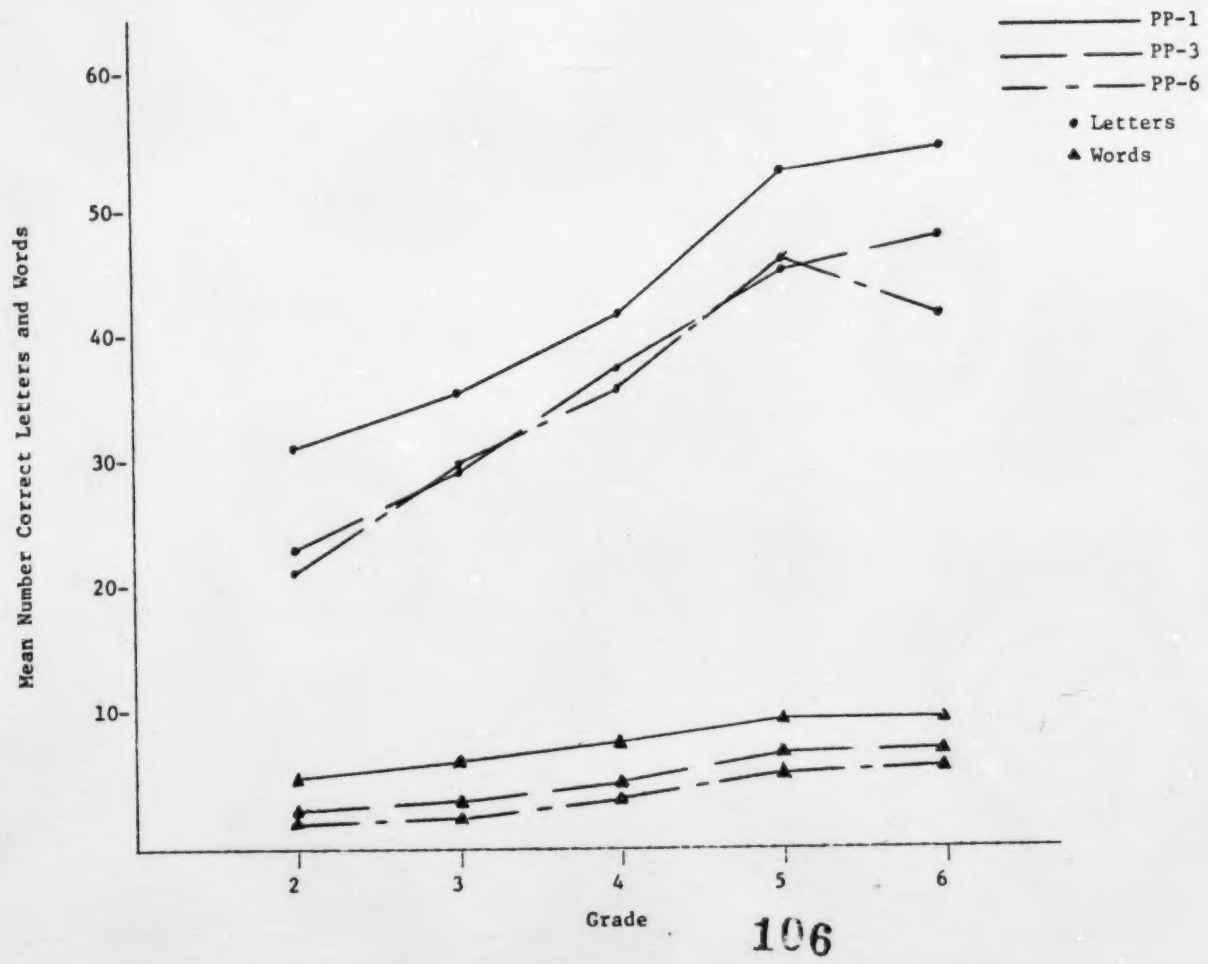

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Figure 9. Letters and Words Correct by Grade in Studies II and III Combined for Combined Samples (N=106).

APPENDIX A

SCORING LETTER SEQUENCES

Procedures for Scoring Letter Sequences

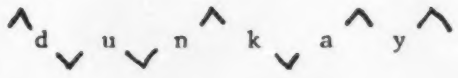
1. Students are given credit for beginning a word with the correct letter.
2. Students are given credit for ending a word with the correct letter.
3. Students are given credit for each occurrence of two consecutive letters in sequence.

Examples

Correct

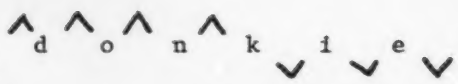
Incorrect

7 correct
0 incorrect

Correct 

Incorrect

4 correct
3 incorrect

Correct 

Incorrect

4 correct
3 incorrect

APPENDIX B

ADDITIONAL TABLES

Table A

Mean Number Correct Letter Sequences by Grade and Group in Study II[a]

Grade/Group	List				
	PP-1	PP-3	PP-6	Ordered	Average
Grade 2					
Regular	27.6	22.8	19.2	30.5	25.0
LD	11.3	3.3	3.3	14.0	8.0
Grade 3					
Regular	23.5	20.7	20.6	27.8	23.7
LD	-	-	-	-	-
Grade 4					
Regular	49.4	45.4	41.8	50.1	46.7
LD	17.0	16.2	12.8	24.8	17.7
Grade 5					
Regular	60.2	50.0	51.2	54.1	55.4
LD	23.2	16.3	19.3	29.2	22.0
Grade 6					
Regular	71.0	69.7	58.0	69.1	67.0
LD	38.6	26.0	21.4	38.0	31.0

[a]Regular sample included 35 students; LD sample included 10 students.

Table B

Mean Number of Correct Letter Sequences by Grade and Group in Study III[a]

Grade/Group	List PP-1	PP-3	PP-6	Ginn (3)	Average
Grade 2					
Regular	41.8	30.9	29.9	30.7	33.3
LD	11.6	8.3	8.4	10.4	9.7
Grade 3					
Regular	45.2	39.4	38.9	38.9	40.6
LD	26.8	20.4	21.8	23.4	23.1
Grade 4					
Regular	64.2	57.8	59.8	61.3	60.8
LD	17.5	14.3	14.6	13.5	15.0
Grade 5					
Regular	78.8	71.3	73.6	76.2	75.0
LD	50.5	41.9	42.8	44.4	44.9
Grade 6					
Regular	58.1	51.3	50.4	48.9	52.2
LD	44.0	34.8	26.4	29.4	33.6

[a]Regular sample included 32 students; LD sample included 29 students.

Table C

Mean Number of Correct Letter Sequences by Grade and Group in Studies II and III[a]

Grade/Group	List PP-1	List PP-3	List PP-6	Average
Grade 2				
Regular	33.7	26.4	23.9	28.0
LD	11.6	7.1	7.8	8.8
Grade 3				
Regular	39.1	33.6	33.2	35.3
LD	26.9	20.4	21.8	23.0
Grade 4				
Regular	53.1	48.5	46.3	49.3
LD	17.4	14.9	14.4	15.6
Grade 5				
Regular	68.1	62.6	60.8	63.8
LD	44.2	36.0	37.4	39.2
Grade 6				
Regular	63.9	59.5	53.8	59.1
LD	41.3	30.4	25.0	32.2

[a]Regular sample included 67 students; LD sample included 39 students.

Table D

Mean Number of Correct Words by Grade and Group in Study II[a]

Grade/Group	List PP-1	PP-3	PP-6	Ordered	Average
Grade 2					
Regular	4.2	2.8	2.1	6.2	3.8
LD	1.0	0.3	0.3	2.6	1.1
Grade 3					
Regular	3.6	2.0	2.0	5.4	3.3
LD	-	-	-	-	-
Grade 4					
Regular	9.2	6.9	5.7	10.1	8.0
LD	2.3	1.8	1.6	4.5	2.6
Grade 5					
Regular	11.4	8.5	6.6	10.9	9.4
LD	2.4	1.2	1.3	5.2	2.5
Grade 6					
Regular	13.4	10.0	7.5	13.4	11.1
LD	5.6	2.6	1.6	6.8	4.2

[a]Regular sample included 35 students; LD sample included 10 LD students.

Table E

Mean Number Correct Words by Grade and Group in Study III[a]

Grade/Group	List PP-1	PP-3	PP-6	Ginn (3)	Average
Grade 2					
Regular	6.7	3.7	2.9	2.9	4.0
LD	0.8	0.3	0.3	0.7	0.5
Grade 3					
Regular	8.0	5.5	4.7	4.9	5.8
LD	3.8	1.9	1.9	1.8	2.4
Grade 4					
Regular	12.4	9.2	7.7	9.1	9.6
LD	1.7	1.1	1.2	0.5	1.1
Grade 5					
Regular	15.4	11.6	10.4	11.6	12.2
LD	8.8	5.2	4.6	5.5	6.0
Grade 6					
Regular	10.8	7.7	6.7	6.9	8.0
LD	7.4	3.8	2.3	2.6	4.0

[a] Regular sample included 32 students; LD sample included 29 students

Table F

Mean Number Correct Words by Grade and Group in Studies II and III[a]

Grade/Group	List PP-1	PP-3	PP-6	Average
Grade 2				
Regular	5.3	3.2	2.4	3.6
LD	0.8	0.3	0.4	0.5
Grade 3				
Regular	6.6	4.5	3.9	5.0
LD	3.8	2.0	1.9	2.6
Grade 4				
Regular	10.0	7.5	6.2	7.9
LD	1.9	1.3	1.1	1.4
Grade 5				
Regular	13.1	9.9	8.3	10.4
LD	7.3	4.3	3.9	5.2
Grade 6				
Regular	12.0	8.7	7.1	9.3
LD	6.5	3.2	1.9	3.9

[a]Regular sample included 67 students; LD sample included 39 students

Table G

Mean Number Letters and Words Correct by Grade in Study II[a]

	Grade 2	3	4	5	6
Letters					
PP-1	26	26	44	44	55
PP-3	21	21	40	39	48
PP-6	18	21	37	38	40
Ordered	29	28	46	43	54
Average	23.5	24.0	41.8	41.0	49.2
Words					
PP-1	4.0	3.6	8.0	7.6	9.5
PP-3	2.6	2.1	6.0	5.4	6.3
PP-6	2.0	2.0	5.0	4.4	4.6
Ordered	5.9	5.5	9.1	8.5	10.1
Average	3.6	3.3	7.0	6.5	7.6

[a]Sample included 45 students (35 regular, 10 LD).

Table H

Mean Number Letters and Words Correct by Grade in Study III[a]

	Grade				
	2	3	4	5	6
Letters					
PP-1	34.8	38.1	35.0	57.1	51.9
PP-3	25.7	32.0	30.6	48.7	43.9
PP-6	25.0	32.2	31.5	49.9	39.7
Ginn (3)	26.1	32.9	31.4	51.8	40.2
Average	27.9	33.8	32.1	51.9	43.9
Words					
PP-1	5.3	6.4	5.7	10.3	9.3
PP-3	2.9	4.1	4.1	6.6	6.0
PP-6	2.3	3.6	3.6	6.0	4.7
Ginn (3)	2.4	3.7	3.7	6.9	5.0
Average	3.2	4.4	4.3	7.4	6.2

[a]Sample included 61 students (32 regular, 29 LD).

Table I

Mean Number Letters and Words Correct by Grade in Studies II and III[a]

	Grade 2	3	4	5	6
Letters					
PP-1	30.5	35.3	40.0	52.6	53.2
PP-3	23.5	29.6	36.1	45.3	45.8
PP-6	21.5	29.7	34.6	45.6	40.2
Average	25.2	31.5	36.9	47.8	46.4
Words					
PP-1	4.6	5.8	7.0	9.4	9.4
PP-3	2.8	3.7	5.2	6.2	6.1
PP-6	2.1	3.3	4.3	5.4	4.6
Average	3.2	4.3	5.5	7.0	6.7

[a]Sample included 106 students (67 regular, 39 LD).

Table J

Correlations of Number of Correct Letter Sequences on Dictated Word Lists with Number Correct on Standardized Spelling Achievement Tests for Regular and LD Students in Three Studies

Study[a]	List	Standardized Test	Correlation[b] Regular	LD
I	PP-6 (3 combined)	TWS	.90	.89
II	PP-1	PIAT	.82	.43[ns]
	PP-3	PIAT	.88	.28[ns]
	PP-6	PIAT	.90	.53[*]
	Ordered	PIAT	.81	.44*
III	FP-1	SAT	.76	.78
	PP-3	SAT	.86	.78
	PP-6	SAT	.86	.82
	Ginn (3)	SAT	.86	.81

[a]Study I sample included 27 regular and 15 LD students. Study II sample included 35 regular and 10 LD students. Study III sample included 32 regular and 29 LD students.

[b]All correlations significant at $p=.001$, except those with ns (nonsignificant) and *($p<.10$).

Table K

Correlations of Number of Correct Words on Dictated Word Lists with Number Correct on Standardized Spelling Achievement Tests for Regular and LD Students in Three Studies

Study[a]	List	Standardized Test	Correlation[b] Regular	LD
I	PP-6 (3 combined)	TWS	.95	.97
II	PP-1	PIAT	.85	.53*
	PP-3	PIAT	.91	.35[ns]
	PP-6	PIAT	.93	.95
	Ordered	PIAT	.83	.49*
III	PP-1	SAT	.80	.80
	PP-3	SAT	.90	.82
	PP-6	SAT	.86	.83
	Ginn (3)	SAT	.89	.84

[a]Study I sample included 27 regular and 15 LD students. Study II sample included 35 regular and 10 LD students. Study III sample included 32 regular and 29 LD students.

[b]All correlations significant at $p=.001$, except those with ns (nonsignificant) and *($p<.10$).

Table L

Correlations of Incorrect Letter Sequence Scores from Different Time Samples with Number Correct on the PIAT in Study II[a]

	First Minute	First 2 Minutes	3 Minutes
Combined Sample[b]			
PP-1	-.77	-.78	-.77
PP-3	-.73	-.70	-.66
PP-6	-.69	-.63	-.58
Ordered	-.37**	-.61	-.67
Regular Sample[c]			
PP-1	-.78	-.79	-.78
PP-3	-.75	-.81	-.70
PP-6	-.67	-.65	-.62
Ordered	-.39**	-.59	-.68
LD Sample[d]			
PP-1	-.13ns	.07ns	-.07ns
PP-3	-.08ns	.25ns	.42ns
PP-6	-.12ns	.32ns	.48*
Ordered	.10ns	-.06ns	.14ns

[a]All correlations significant at $p = .001$, except those with ns (nonsignificant), * ($p < .10$), ** ($p < .05$), and *** ($p < .01$).

[b]Sample included 45 students.

[c]Sample included 35 students.

[d]Sample included 10 students.

Table M

Correlations of Incorrect Letter Sequences Scores from Different Time Samples with Number Correct on the Stanford-Spelling in Study III[a]

	First Minute	First 2 Minutes	3 Minutes
Combined Sample[b]			
PP-1	-.67	-.65	-.71
PP-3	-.48	-.59	-.65
PP-6	-.65	-.59	-.55
Ginn (3)	-.55	-.65	-.70
Regular Sample[c]			
PP-1	-.72	-.67	-.70
PP-3	-.69	-.74	-.78
PP-6	-.75	-.68	-.60
Ginn (3)	-.64	-.71	-.76
LD Sample[d]			
PP-1	$-.50^{**}$	$-.53^{**}$	-.61
PP-3	$-.10^{ns}$	$-.21^{ns}$	$-.29^{ns}$
PP-6	$-.35^{*}$	$-.29^{ns}$	$-.32^{*}$
Ginn (3)	$-.30^{ns}$	$-.48^{**}$	$-.52^{**}$

[a]All correlations significant at $p = .001$, except those with ns (nonsignificant), * ($p < .05$), and ** ($p < .01$).

[b]Sample included 61 students.

[c]Sample included 32 students.

[d]Sample included 29 students.

Table N

Correlations of Number of Incorrect Words from Different Time Samples with Number Correct on the PIAT in Study II[a]

	First Minute	First 2 Minutes	3 Minutes
Combined Sample[b]			
PP-1	-.80	-.80	-.80
PP-3	-.73	-.73	-.73
PP-6	-.68	-.69	-.67
Ordered	-.39*	-.59	-.67
Regular Sample[c]			
PP-1	-.83	-.82	-.81
PP-3	-.75	-.76	-.76
PP-6	-.68	-.73	-.73
Ordered	-.40*	-.57	-.68
LD Sample[d]			
PP-1	.26ns	.01ns	-.20ns
PP-3	-.05ns	.06ns	.30ns
PP-6	-.17ns	.09ns	.30ns
Ordered	.10ns	-.12ns	-.09ns

[a]All correlations significant at $p = .001$, except those with ns (nonsignificant) and * ($p < .01$).

[b]Sample included 45 students.

[c]Sample included 35 students.

[d]Sample included 10 students.

Table O

Correlations of Number of Incorrect Words from Different Time Samples with Number Correct on the Stanford-Spelling in Study III[a]

	First Minute	First 2 Minutes	3 Minutes
Combined Sample[b]			
PP-1	-.68	-.66	-.71
PP-3	-.46	-.51	-.59
PP-6	-.49	-.51	-.51
Ginn (3)	-.52	-.62	-.67
Regular Sample[c]			
PP-1	-.72	-.68	-.70
PP-3	-.68	-.66	-.74
PP-6	-.71	-.62	-.59
Ginn (3)	-.60	-.68	-.72
LD Sample[d]			
PP-1	-.51*	-.52*	-.60
PP-3	.01ns	-.00ns	-.13ns
PP-6	.13ns	-.11ns	-.16ns
Ginn (3)	-.21ns	-.43*	-.47*

[a]All correlations significant at $p = .001$, except those with ns (nonsignificant) and * ($p < .01$).

[b]Sample included 61 students.

[c]Sample included 32 students.

[d]Sample included 29 students.

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